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Ministry of Natural Resources and Environment: Spreading the meaning of planting trees and greening mountainous areas

▲ *Prime Minister Nguyễn Xuân Phúc attends a ceremony in Nghệ An Province to respond to the National Program of planting 1 billion trees*

On March 14th, 2021, Prime Minister Nguyễn Xuân Phúc attended a ceremony to respond to the National Program of planting 1 billion trees "For a green Vietnam" organized by the Ministry of Natural Resources and Environment (MONRE) in cooperation with Nghệ An Province at the national historic site of Truông Bồn, Đô Lương District.

The Ceremony was attended by the Member of the Politburo, Secretary of the Hanoi Party Committee Vương Đình Huệ; Member of the Politburo, Head of the Party Central Committee's Commission for Internal Affairs Phan Đình Trạc; Vice Chairman of the National Assembly Uông Chu Lưu and leaders of other Ministries. The participants from the MONRE include Minister Trần Hồng Hà, Deputy Minister Võ Tuấn Nhân and leaders of units directly under the Ministry.

Speaking at the Ceremony, Minister Trần Hồng Hà affirmed that the National Program of planting 1 billion trees "For a green Vietnam" in the period of 2021 - 2025 was initiated by the Prime Minister. This Program brings great significce that not only greening bare land, restoring the forestry ecosystem but also greening every street corner, road, offices, schoolyards and house in urban and rural areas across the country. The Program also aims to correct the mistakes in dealing with nature during the past long time and "make Việt Nam become an attractive destination for living in harmony with nature on the world map". Along with that, it contributes to the global pledge for nature "Unite to reverse biodiversity loss by 2030 for sustainable development" and the United Nations Decade of Ecosystem Restoration 2021 - 2030.

Following the call of the Prime Minister, along with Ministries, line Ministries and localities across the country, the MONRE has implemented various activities to protect the environment, contributing to the spread of tree planting and ecological preservation. The Ministry has elaborated and submitted to the Prime Minister for consideration and approval a scheme on restoring and developing a green tree system with the overall goal of maintaining green tree infrastructure, natural ecosystems and sustainable development of urban biodiversity and green tree ecosystems in critical areas to ensure ecological functions in environmental protection, response to climate change, flood prevention and disaster mitigation. The scheme helps to overcome the existing shortcomings and inadequacies, in which the tree planting is undertaken based on a specific scientific basis. Ac-

cordingly, the process of planting, tending, and protecting trees and selection of varieties are suitable for the characteristics of the ecosystem, biodiversity, soil, water sources and requirements for greenery functions. Consequently, it creates substantial and strong movements in the whole society, including organizations, businesses, households and individuals for planting trees and protecting the environment and nature.

On this occasion, Minister Trần Hồng Hà suggested other Ministries and line Ministries study and complete the institutions and policies on green tree planning; mechanisms and policies to encourage the society to plant and protect trees and enjoy environmental values. The provinces and centrally-run cities direct the review of land fund and the coverage of green trees, selection of suitable varieties, application of modern technologies in growing and protecting green trees; promptly commend and reward the best practices, best models and the best value initiatives.

With the desire to spread the meaning of planting trees and greening mountainous and rural areas, the MONRE gifted 10,000 Chittagong wood and golden oak trees to the people of Đô Lương District▪

TRẦN TÂN

Việt Nam saves 353,000 kWh of electricity during Earth Hour

According to the National Power Dispatch Centre, Việt Nam saved 353,000 kWh of electricity, equivalent to 658.1 million VND (28,635 USD), during one hour from 20:30 to 21:30 on March 27th 2021, when the entire country turned off unnecessary electric appliances in response to Earth Hour 2021.

The Earth Hour 2021 Campaign, initiated by the World Wide Fund for Nature (WWF) with the theme "Speak up for nature", took place in Việt Nam on March 27th evening to raise public awareness of the relationship between human activities in the natural world and the causes of epidemics and pandemics, especially COVID-19. The Ministry of Natural Resources and Environment (MONRE) and the Ministry of Industry and Trade has received warm response from people across 63 cities and provinces. The Electricity of Việt Nam (EVN) and its member companies nationwide encouraged organisations, offices and customers to switch off unnecessary electrical devices during Earth Hour.

The event aimed to highlight the connection between humans and nature and the correlation relationship between species, thus prompting specific actions in saving energy so as to reduce greenhouse gas emissions. The event also aims to encourage initiatives on community building sustainable economic development and integration with nature, protecting biodiversity and effectively responding to climate change. Another target of the event is to calls on organizations and individuals to limit the use of single-use plastics to wipe out plastic waste in the environment.

MONRE called for action by each individual and organization to reduce the burden on the environment by rejecting, minimizing, reusing and recycling waste, especially plastic waste and disposable plastic products; using environmentally-friendly public transport; investing in energy-saving equipment; and turning off or unplugging devices when not in use and encouraging the use of renewable energy▪

HỒNG NHUNG

MONRE and the VFF enhance cooperation

▲ *At the event*

The Ministry of Natural Resources and Environment (MONRE) and the Vietnam Fatherland Front (VFF) Central Committee held a conference in Hà Nội on January 12th to review their cooperation program for the 2017 - 2020 period.

Accordingly, both sides raised public awareness of environment protection efforts, including leading eco-friendly lives as well as properly use and tap natural resources.

Residents raised their sense of responsibility for monitoring environment protection by individuals, organizations and businesses in the process of carrying out socio-economic activities in their residential areas. They also fought violation behaviors in the field in localities.

During the period, standing board of the VFF Central Committee assisted 50 out of 63 cities and provinces in building and spreading 344 exemplary models of environment protection. The two sides also worked with relevant agencies to oversee the exploitation of natural resources and climate change response in 10 cities and provinces. The VFF chapters at all levels held 2,550 inspections and collected public feedback to report to authorities.

At the conference, Minister of Natural Resources and Environment Trần Hồng Hà wished that the MONRE and the VFF would continue working closely together on state management areas to further uphold their role in response to climate change, natural resources management and environment protection.

President of the VFF Central Committee Trần Thanh Mẫn proposed the inspection of Environment Protection Law enforcement at manufacturing facilities, improving environment at major urban, industrial areas and craft villages, contributing to mitigating plastic waste.

Concluding the event, the VFF Central Committee and the MONRE signed a cooperation program in the field for the 2021 - 2025 period.

On the occasion, Minister Trần Hồng Hà presented the insignia "For the cause of natural resources and environment" to Secretary of the Party Central Committee and President of the VFF Central Committee Trần Thanh Mẫn and Vice President and Secretary General of the VFF Central Committee Hầu A Lềnh.

The VFF Central Committee also honored 10 collectives and 20 individuals while the MONRE handed over certificates of merit to 10 collectives and five religious' organizations in honor of their dedication in environment protection during 2017 - 2020▪

NHẬT MINH

Active environmental management and protection towards the sustainable development goals of the country

DR. NGUYỄN VĂN TÀI - ***Director General***
Vietnam Environment Administration

The year 2020, the end of the 2016 - 2020 term, in the context of many difficulties and challenges, especially the serious impacts and effects of the Covid-19 pandemic, but thanks to the drastic, timely and effective direction and administration of the National Assembly, the Government, the Prime Minister, the Leaders of the Ministry of Natural Resources and Environment (MONRE), the efforts of the Vietnam Environment Administration (VEA), the relevant agencies at different levels, sectors, local autorities, organizations and people, environmental management and protection have achieved positive results in many aspects, of which the following are outstanding:

Establishing a consistent and breakthrough legal corridor to make environmental protection the pillar of the sustainable development process: In the period of 2016 - 2020, the VEA has developed and advised the MONRE to submit to the Government, the Prime Minister to issue 7 Decrees, 3 Decisions, 3 Directives and many other important Plans and Projects; issued under its authority 15 Circulars, 1 Joint Circular guiding the implementation of the Law on Environmental Protection (LEP) 2014 and the Law on Biodiversity 2008 and 12 National Technical Regulations on environment. In particular, the VEA has concentrated all resources and made maximum efforts to implement the direction of the Minister and lcjeaders of MONRE in developing and submitting to the Government and the National Assembly for consideration and approval of the LEP 2020 (Law No. 72/QH14). For the first time, the Law is designed as a policy framework aiming to form a basic legal corridor on environmental protection that is holistic, comprehensive and in harmony with the socio-economic legal system. The cross-cutting and central goal of the LEP 2020 is to ensure the quality of the living environment to protect the health of the people, to change the management method in the direction of adhering to reality, meeting the requirements of integration and reform of administrative procedures but it still ensures the effectiveness and efficiency of environmental management tools, focusing on high-risk groups. The Law synchronizes environmental management tools throughout the life cycle of a development investment project, starting from planning, reviewing investment policy, making investment decisions, implementing projects until operating production, trading, and service activities and ending activities. Along with that, the Law has also reduced and simplified administrative procedures, contributing to reducing the compliance costs of enterprises for the group that is less likely to pollute or adversely affect the environment; promoting environmentally-friendly, low-carbon, circulating economic models, investing in restoration of natural ecosystems for both economic development and environmental protection, minimizing the impacts of climate change. With many new and breakthrough points, the LEP 2020 will create great changes in awareness and action in environmental management and protection in order to ensure that environmental issues along with the economy and society must be placed at the center of development decisions, not exchanging the environment for economic growth for sustainable development of the country.

Renovating management thinking, shifting focus from passive response to proactive control and monitoring of environmental issues: Entering the period of 2016 - 2020, the Communist Party and State have thoroughly implemented the policy on economic development without affecting the environment, based on strict management of natural resources and proactive response to climate change. For the environmental management and protection, from being passive, confused in handling and solving cases and incidents of environmental pollution, so far we have established a mechanism to manage and monitor environmental pollution issues, actively coordinated with local authorities and organizations concerned in handling cases of environmental pollution, environmental hot spots. Accordingly, established and maintained 12 monitoring teams for projects and production facilities with high risks of environmental pollution and incidents to ensure these projects operate in an environmentally safe manner that contributes to growth; coordinated investment in installation of 867 waste source monitoring stations with direct data connection to the Departments of Natural Resources and Environment and the MONRE for monitoring and supervision; established and effectively maintained the Environmental Hotline from Central to local

▲ *Overview of the VEA's meeting on review of 2020 activities and directions for tasks of 2021 on 22nd December 2020*

levels to collect information and solve environmental pollution issues arising from the grassroots.

In addition, the VEA proactively and promptly advised the MONRE and the Prime Minister to direct a number of urgent tasks and solutions on environmental protection; strengthened the management over the import and use of imported scraps as raw production materials; strengthened solid waste management; controlled invasive alien species and air pollution. As a result, the VEA focused on controlling 20 - 30% of objects at high risk of pollution, controlling up to 80% of environmental problems; resolutely resolved more than 1,000 petitions, reflections received via hotlines (accounting for about 66%); ensured to handle nearly 90% of proposals of businesses and local authorities on time. Thereby, the people's satisfaction index for the state management on environmental protection has increased year by year.

Achieving positive results in waste management, environmental quality improvement, nature and biodiversity conservation: Many investment projects on building centralized solid waste treatment facilities have been put into operation in localities, some big cities such as Hà Nội and Hồ Chí Minh City have invested in and built large-scale solid waste treatment complexes. In the past 5 years, the rate of domestic wastewater collected and treated, the rate of domestic solid waste collected and recycled have continuously increased; the rate of landfilling has decreased; hazardous waste is better controlled and managed through strict control of the source, collection, storage, transportation and treatment. The rate of domestic wastewater collected and treated has reached 13% (an increase of about 6% compared to 2016); the rate of solid waste collected and treated in urban areas averaged about 92% (an increase of 7% compared to 2016) and in suburbs of urban centers averaged about 66% (an increase of 15% compared to 2016); the rate of hazardous waste treated reached 85% (an increase of about 6% compared to 2017); completed the thorough handling of 340/435 establishments seriously polluting the environment (an increase of 30.2% compared to 2016); the number of communes meeting the new rural environmental standards increased by 8.3%. The number of protected areas, Ramsar sites in the country continues to increase. Currently, the country has 172 protected areas, including 33 national parks; 65 natural reserves; 18 species and habitat reserves; 56 landscape protected areas (an increase of 6 protected areas compared to 2016); 9 Ramsar sites (an increase of 2 sites compared to 2016); 10 ASEAN Heritage Gardens (an increase of 4 ASEAN Heritage Gardens compared to 2016).

Promoting digital transformation, increasing the application of information technology, developing an e-Government in environmental management and protection: With diversified and urgent activities, while the human resource is limited, the VEA attaches great importance to the application of information technology in direction and administration, serving state management tasks. Accordingly, the VEA has

performed more than 50% of online public services at level 3 and 4 in settling environmental administrative procedures; established and organized hundreds of online meetings, conferences, seminars; developed national environmental database; strengthened the system of environmental monitoring, supervision and warning from the central to local levels and grassroots levels; put into use the Envisoft application on mobile devices to publish information online on air quality (VN AQI) nationwide for the community, up to now it has been connected with the National Public Service Portal.

However, to date, there are still many limitations in environmental management and protection in the country; the environment has been under great pressure from the sources of environmental pollution; the number, size and extent of impacts from the operation of industrial zones, urban centers, craft villages and production, business and service establishments have increased. Many environmental problems remain, especially air pollution in big urban centers and cities; domestic waste, especially rural domestic waste, has not been sorted, collected and treated effectively; domestic wastewater, wastewater from craft villages and industrial clusters generated more and more while collection and treatment infrastructure did not meet the requirements; the area of natural ecosystems has been narrowed due to the change of land use purposes, forest fires and deforestation have increased. Wild flora and fauna continued to decline; risks from invasive alien organisms and risks from genetically modified organisms remain.

The year 2021 is of particular importance, the first year to implement the 10-year socio-economic development strategy 2021 - 2030, the 5-year socio-economic development plan 2021 - 2025 and 5-year plans on the different fields. It is forecasted that the world and regional situation will continue to develop complicatedly and unpredictably, countries are increasingly focusing on environmental technical barriers, the trend of shifting backward and environmentally unfriendly technologies into the underdeveloped countries continues to take place. The Covid-19 pandemic cannot end soon, the negative impacts may last long, affecting many sectors and fields, including the environmental field. Trends in investment, trade, digital transformation, along with rapid changes in business models, production and consumption methods, social communication, science and technology... continue to grow. In the country, in addition to the opportunities, advantages and inheritance of the results achieved in the previous period, the impacts of epidemics, climate change, digital transformation trends, requirements for development investment to ensure rapid and sustainable economic growth will have impacts, creating great pressure on environmental protection, while resources, awareness and responsibility for environmental protection are still limited. These will be the challenges facing the environmental protection in 2021 and the following years of the period of 2021 - 2025.

With important results basically achieved, overcoming difficulties, turning challenges into opportunities, creating a strong foundation for environmental management and protection in the period of 2021 - 2025 towards sustainable development, the VEA shall focus on performing the following key tasks:

First, continue to improve mechanisms, policies and laws on environmental protection; regulations and standards to meet the requirements of practice for the period of 2021-2030 with three main contents:

- Focus on developing and submitting on schedule, ensuring the quality of Decrees and Circulars guiding the implementation of the LEP in 2020 to ensure the implementation of the Law from January 1st 2022; Circular providing technical regulations on environmental monitoring; National strategy on biodiversity for the period of 2021 - 2030, with a vision to 2050; Project on inventorying, monitoring, reporting and developing biodiversity database for the period of 2021 - 2030, with a vision to 2040; National action plan for the conservation and sustainable use of wetlands in Việt Nam for the period of 2021 - 2030; List of important wetlands nationwide.

- Develop the National environmental protection plan for the period of 2021 - 2030, with a vision to 2050; National biodiversity conservation plan for the period of 2021 - 2030, with a vision to 2050; Master plan on national environmental monitoring for the period of 2021 - 2030, with a vision to 2050.

- Develop and complete the system of national regulations and standards on environment in accordance with the LEP in 2020, including new groups of environmental standards such as waste management standards, especially in the field of domestic solid waste treatment to suit current technologies such as domestic solid waste treatment combined with energy recovery, gasification…; regulations on transport vehicle gas emissions; regulations on the limits of persistent pollutants in raw materials, fuels, materials, products, goods and equipment. Review and develop technical processes, unit price norms for state management of environmental protection.

Second, work closely with Ministries, sectors and local authorities to deal with the environmental pollution issues

associated with a large number of people. The focus is on implementing the Prime Minister's Directive No. 41/CT-TTg of 1st December 2020 on number of urgent measures to strengthen the solid waste management; Prime Minister's Directive No. 03/CT-TTg of 18th January 2021 on strengthening air pollution control; increasing measures to monitor and control waste sources discharged into polluted river basins and polluted surface water sources in urban areas, residential areas and key economic regions; speeding up the relocation of industrial production establishments that pollute the environment or are inconsistent with the planning out of urban areas and residential areas. Strengthen and efficiently operate the environmental pollution hotline from the Central to the district level across the country to solve the environmental pollution issues right from the specific grassroots and areas. Actively review, grasp and promptly handle information reflecting and recommending on environmental pollution on media and press agencies.

Third, proactively prevent, supervise and control projects and waste sources that are at high risk of polluting the environment. Formulate regulations on environmental criteria for development investment selection and decision; classify projects from the stage of investment preparation, proactively prevent and control the group of projects with high risk of pollution; continue to innovate, to improve quality and efficiency of strategic environmental assessment, environmental impact assessment; continue to proactively carry out environmental monitoring activities for large facilities and projects with high risks of polluting the environment, ensuring that projects operate safely on the environment through continuing to maintain, strengthen and improve operational efficiency, environmental monitoring mechanisms, not letting serious environmental problems occur; strictly control the environment in industrial parks, industrial clusters and craft villages; organize to urge, guide and inspect the work of thoroughly handling pollution in 47 particularly seriously polluting craft villages; strengthen coordination with Ministries, sectors and local authorities to promptly and effectively respond to environmental cases and incidents that arise.

Fourth, improve the efficiency of nature and biodiversity conservation. Promote activities to protect and restore important natural ecosystems; expand the area of natural reserves and natural heritages; enhance control of negative impacts of projects and economic activities on nature and biodiversity; review, evaluate and propose a plan to amend the Law on Biodiversity; formulate a master program on conservation of endangered precious and rare species prioritized for protection.

Fifth, focus on inspecting and investigating the compliance of the legal provisions on environmental protection for 17 types of industrial production that are at risk of polutting the environment, hazardous waste treatment facilities, facilities with large volume of gas emissions, facilities and projects that have great impacts on natural heritages and biodiversity according to the legal provisions.

Sixth, enhance the capacity of environmental quality monitoring and warning. Focus on well implementing periodic environmental monitoring program, especially the system of air monitoring stations to provide information on air quality to the people and organizations; strengthen capacity of urban air monitoring system, capacity of environmental monitoring in regional centers; improve management efficiency and operational quality of environmental monitoring activities.

Seventh, promote the application of information technology and implement digital transformation in the environmental field. Effectively implement the provision of online public services at levels 3 and 4 for 100% of environmental administrative procedures; integrate, provide on the National Public Service Portal for service groups related to appraisal and approval of environmental impact assessment reports and environmental licensing; connect and share digital data on the Government Report Information System in service of the Government's and Prime Minister's direction and administration; develop and form a synchronous, unified national environmental database and information system connecting and sharing from the Central to local levels; increase the use of online working methods in directing, administering and performing tasks.

Eighth, strengthen propaganda, education, awareness raising on environmental protection, promote the role of socio-political organizations, communities in environmental protection. Focus on propaganda and introduction of the provisions of the LEP 2020, implement strong communication models to create a unity in the whole society on awareness and action on environmental protection, especially the LEP 2020. Discover and replicate good models, good practices; promptly commend and praise collectives and individuals with achievements and initiatives in environmental protection. Effectively promote the role and participation of socio-political organizations, communities, the masses of the people from policy making, monitoring of law policy implementation and mobilizing resources for investment in environmental protection■

Preliminary review of three-year implementation of the Government's Resolution No. 120/NQ-CP on climate resilient and sustainable development of the Mekong River Delta

In 2017, the Vietnamese Government issued the Resolution No.120/NQ-CP on climate resilient and sustainable development of the Mekong River Delta (MRD) that has demonstrated a strategic vision with the policy of "thuận thiên" (nature-based) development to proactively address challenges caused by climate change and exploitation of Mekong River's water resources in order to realize its full potentials, capabilities, strengths, creating a strong momentum for the development of MRD. After more than three years implementing the Resolution, the nature-based orientation has gradually proved to be efficient, creating a fundamental change in the awareness, rationale and actions of all levels, sectors and local agencies in the MRD with active participation of people and enterprises and supports from international organizations and development partners. Although the implementation time has not been very long, there have been some remarkable achievements, specifically as follows:

SOME HIGHLIGHTED ACHIEVEMENTS

Enabling institutions and policies to promote sustainable development in the MDR

In recent years, many mechanisms and policies have been studied and proposed for investment for sustainable development of the MDR, particularly in some areas such as renewable energy and energy efficiency, environmental infrastructure and engineering, agriculture and aquaculture, food processing and related transportation services… As a result, they have supported to attract enterprises to invest heavily in agriculture, strengthening the linkage of four actors, including managers, investors, scientists and farmers, to improve the value chain, creating a foothold for agricultural products in the world market; amending land policies to remove bottlenecks to create an open mechanism to attract investment. The promulgation of the Reform Action Framework for mechanisms and policies for the MRD served as the basis to attract resources contributing toward the development of specific mechanisms and policies for sustainable development in the MRD.

In addition, Ministries, in their competence, have issued mechanisms and policies for regional development, such as preferential policies to encourage investors to become the nucleus for the restructuring of the agricultural sector towards modernization, application of high technologies, increase in added value and competitiveness, climate change adaptation and administrative reform in order to promote the wave of start-ups in agriculture and rural areas. On that basis, businesses and foreign investors have implemented many projects in the fields of agriculture, transportation and renewable energy... contributing to changing the face of the MRD and promoting the economic development of the country.

Proactively adapting to climate change by enhancing climate monitoring capacity, early weather forecasting and timely warning of natural disasters

Ministries, sectors and local agencies have strengthened investigations, surveys, warnings and forecasts in the fields of environment and climate change contributing to socio-economic development according to the Resolution's nature-based orientation, demonstrating in the following aspects: Strengthening the monitoring network of hydro-meteorology, oceanography, mud and sand fluctuations, automatic rain measurement; Actively investigating, surveying, exploring, searching and rationally exploiting water resources for daily use and production in the MRD in dry seasons and saline intrusion periods. Agricultural production has been gradually transformed to form large-scale concentrated production areas, specializing in key products (shrimp, pangasius, rice, fruit) applying processing and consumption technology along the value chain of agricultural products, in line with the policy for increasing production of seafood, fruits and reducing production of rice. It also focuses on exploiting potentials of clean energy and renewable energy. Many economic models suitable to natural conditions, with high-tech application and climate change adaptation have been deployed and developed by local agencies, for example the sustainable shrimp farming model; selecting, breeding and developing varieties of plants, animals and aquatic varieties with potentials and strengths of the region. Besides, ecological strengths, cultural and history heritages are conserved and developed, thereby promoting tourism and service economy in the MRD.

Forming the development space, and infrastructure planning connecting within the region and with Hồ Chí Minh City, the Southeast region.

On the basis of promoting advantages and spillover effects of development in Hồ Chí Minh City and the Southern key economic region with the MDR, the development of inter-regional connectivity in terms of infrastructure and economy has been instructed by the Prime Minister, including developing inter-regional traffic routes, forming large-scale industrial parks and cities to ensure the overall connectivity. The exploitation of sand from river bed for ground levelling is gradually limited through the promulgation of 20 technical standards and guidelines on the use of ash, slag and gypsum as raw materials for construction material production and use in construction works.

Environmental protection in rural areas has received attention and investment, especially in domestic waste and wastewater treatment in residential areas and improvement of landscape, environmental protection equipment support. Solid waste management has been strengthened together with the implementation of investment projects on solid waste treatment facilities, wastewater collection and treatment systems. The project of MRD safe water supply has been implemented, ensuring sufficient water supply capacity and quality for water and social security.

The MDR Regional Coordination Council was established with operational regulation to advise, propose and assist the Prime Minister in instructing, coordinating, examining and supervising the implementation of regional linkage and climate resilient and sustainable development of the MRD. At the same time, Coordination Groups at ministerial and provincial level and expert advisory groups have been formed to assist the Council effectively, advise the Prime Minister on specific mechanisms, policies, strategies, plans, programs and projects of regional and inter-regional scale for climate resilient and sustainable development of the MRD. It provides the initial foundation for the formation and implementation of mechanisms and policies more suitable to the MDR's natural features and socio-economic conditions in order remove barriers and effectively release resources in the future.

PROMOTING PUBLIC INVESTMENT AS SEED CAPITAL TO ENCOURAGE THE INVESTMENT FROM PRIVATE SECTOR AND THE INTERNATIONAL COMMUNITY FOR SUSTAINABLE DEVELOPMENT OF THE MRD.

In recent years, as a tectonic government, the Government and the Prime Minister have always paid attention to and promoted public investment as catalyst for resolving urgent livelihood issues. The Government has also issued many preferential mechanisms and policies on taxes and fees to encourage investment and development of the agricultural sector, such as exemption of corporate income tax for crop and livestock production, farming and processing agricultural products of cooperatives; personal income tax exemption for individuals directly engaged in agricultural production, forestry, salt production...; exemption of agricultural land use tax; exemption of registration fees for land assigned by the State for agricultural production purpose; exemption of irrigation fees, credit policy for building, upgrading ships, subsidizing interest rates; credit for local socio-economic infrastructure development projects from the Local Development Investment Fund.

Strengthening scientific research, technology development, international cooperation and awareness-raising communication

Scientific research and technology development activities have been invested in to provide scientific and practical bases for sustainable development of the MDR in a fundamental and systematic manner with a long-term vision such as studying, selecting and breeding plant varieties, soil improvement; prevention of natural disasters, land subsidence, landslide of river banks and coastlines; research on changes in water resources, water quality and proposal of appropriate exploitation solutions to change production structure; surface water monitoring and drought warning; assessing the causes of riverbank erosion in some key areas and propose orientations for structural and non-structural solutions; testing and proposing solutions and technologies to prevent, combat and mitigate the impacts of natural disasters and overcoming their consequences; developing the climate change monitoring system in the MRD...

Communication and awareness raising activities have been strengthened through the propaganda project for implementation of Resolution No. 120/NQ-CP, propaganda activities on sustainable development of the MDR with climate change adaptation. From 2017 up to now, the topic of the MDR's sustainable development with climate change adaptation has been promoted by Central and local press agencies with diverse contents and forms such as films and newspaper articles; formulating and disseminating materials to raise the community's awareness of mangrove forest development and protection in some provinces of the MDR.

International cooperation is promoted to attract resources, knowledge and technology for the MRD. Việt Nam has proactively participated in many bilateral and multilateral cooperation frameworks for developing the MRD's sub-regions, including cooperation mechanisms for Mekong-Japan, Mekong-South Korea, and the GMS (Greater Mekong Subregion), Mekong- Lancang, Mekong - Ganges, CLMV, ACMECS, US-

Mekong Partnership. In particular, in 2020, Việt Nam as Chair of ASEAN proactively connect the MRD in ASEAN to find a common voice on the importance of sub-regional development.

OVERALL ASSESSMENT, LIMITATIONS, CAUSES AND CHALLENGES

After more than 3 years implementing the Resolution, it can be confirmed that the MRD has witness significant changes in the nature-based and sustainable direction. Accordingly, people's livelihood has been gradually improved and the MRD's development picture is increasingly painted with many bright colors. Particularly, the development space forming through transport infrastructure connection, regional connectivity has been progressing that has changed the MRD's outlook. GDP growth has been maintained at high level, with 2018 and 2019 recording impressive rate of about 7,3%. The cultural and spiritual life has been gradually improved. At the same time, traditional cultural values of the region have been gradually conserved, developed and effectively exploited to serve people in the MRD, in the country as well as international tourists. Diseases have been monitored, controlled and tend to decrease. The rate of rural households having hygienic latrines in the MRD in 2019 reached 62% (an increase of 6.7% compared to 2017).

On the other hand, there have been limitations in the implementation of the Resolution No. 120/NQ-CP. Over the past three years, the Government and the Prime Minister have closely instructed Ministries and local agencies to promulgate, supplement and improve a number of mechanisms and policies for the MDR. Nevertheless, these mechanisms and policies require time to be effective. Many works and projects that are being inter-regional, inter-sectoral, and large-scale are still slow in implementation. The mechanism to attract investment from the private sector and the society still faces many difficulties and it has not yet been able to make a breakthrough, especially due to the impacts of Covid-19 pandemic. Infrastructure projects still lack synchronous connection, multi-purposes to create a driving force for developing markets for agricultural products as advantages of the region such as rice, fruit, and aquatic product markets. Scientific research, basic survey and database have just recently been focused in recent times, so they have not provided enough scientific basis and support for the planning and policy-making process. The region's strengths in agriculture, tourism and sea have not yet been made clear to propose effective solutions.

There have been also many challenges in MRD. Climate change and natural disasters are happening faster, more complicated and continue to be unpredictable due to the volatility and extreme events, especially short-term impacts. In the context of global efforts to respond to climate change, especially reduction of greenhouse gases emission has not yet met the exception under the United Nations Framework Convention on Climate Change as well as the Paris Agreement, MRD will continue to face many adverse impacts in the near future. The exploitation and use of water resources upstream, especially the deployment of hydro-power projects on the Mekong mainstream, has been increasingly complicated, while the sub-regional coordination mechanism has indicated shortcomings and difficulties, leading to low efficiency. The lack of sand, alluvial and water is expected to exacerbate seriously, negatively impacting the MRD's development. Resolution No. 120/NQ-CP has just been implemented for more than 3 years and is only at the beginning stage, while the objectives, visions and tasks in the Resolution are strategic and long-term. Therefore, it needs more time and resources to fully implement.

RECOMMENDATIONS FOR PROMOTING SUSTAINABLE DEVELOPMENT OF THE MEKONG DELTA IN THE PERIOD 2021 - 2025, WITH A VISION TO 2030

Finalizing institutional and policy mechanisms

Reviewing, supplementing and improving the system of mechanisms and policies specified in the Resolution and the overall Action Program, especially the mechanism for resource mobilization through public-private partnership, land concentration for large-scale conversion, flexible planning of rice-growing areas in order to be proactive in restructuring production in accordance with natural conditions each year.

Urgently issuing the MRD Master Plan for the period of 2021 - 2030, with a vision to 2050 as the basis for implementing the MRD's socio-economic development plan; synchronously implementing tasks and solutions to develop the MRD's provinces and cities in accordance with Resolutions of the Party and the State .

Prioritizing to allocate resources to implement investment projects in infrastructure, transportation, irrigation, prevention of riverbank and coastal erosion for the purpose of production

Urgently supplementing capital to implement the MRD Development Policy Operation (DPO) under the allocated amount for specific tasks and projects, including connectivity projects, projects with inter-regional impacts, projects serving as driving force for rapid and sustainable socio-economic development. Supplementing investment capital for the MRD's sustainable development through financial institutions and credit institutions including the Vietnam Environment Protection Fund. Investing in multi-purpose infrastructure projects, with regional and inter-regional connection in terms of

irrigation, transportation, economic activities, promoting economic restructuring, trade development, creating value chains for products in the MRD.

Implementing programs, projects approved by the Prime Minister: Overall Program for Sustainable and Climate-Smart Agricultural Development in the MRD to 2030, with a vision to 2045, Irrigation Modernization Scheme for Sustainable Agricultural Development in Ecological Subregions of the MRD, Scheme for Riverbank and Coastal erosion prevention and control to 2030, Scheme for Safe Water Supply in the MRD, Restructuring Plan for Agricultural Sector in the period 2021 - 2025...

Strengthening basic investigation, monitoring, forecasting and completing the database system

Strengthening investigation and assessment of land resources; investigating, evaluating and developing water storage solutions based on natural trends of each sub-region. Improving the MRD Data Integration Center, building and updating the MRD database system for climate change adaptation, connecting with the database of the International Mekong River Commission and other countries in the Mekong River Basin.

Investing to increase the number of monitoring stations for hydro-meteorology, environment, water resources, landslide, land subsidence, saline intrusion to provide information, data, forecast analysis for the MRD Data Integration Center to develop strategies, planning, policies for development and other socio-economic activities in the region. Strengthening capacity of hydro-meteorological forecasting, early warning of natural disasters and extreme weather events. Developing the system of monitoring, forecasting and early warning of changes in water resources, covering the upstream, the entire basin, riverbank and in coastal subsidence and erosion.

Continuing to investigate and search for underground water sources, especially deep-lying aquifers for domestic water supply in areas with frequent salt water intrusion; developing groundwater exploitation facilities to be ready to respond to saline intrusion when necessary. Proactively and closely monitoring water exploitation and use in the basin, collecting information and data on the basin situation from many other sources (from projects, with remote sensing technology...).

Promoting large-scale transformation, speeding up rational restructuring

As for agriculture: Developing agriculture in 3 sub-regions (upper delta, midlands and coastal areas), taking into consideration agricultural ecosystems in each sub-region. Shifting the strategic pillar to seafood - fruit - rice; increasing the production value of aquatic products and fruits, decreasing the production of rice.

As for industry and commerce: Taking advantage of the strengths, pervasiveness and development of Hồ Chí Minh City region to strongly promote industry to create a driving force for regional development; forming specialized industrial zones and clusters in line with key regions and strengths of local areas in the region; focusing on the development of processing and supporting industries to increase the value of agricultural products; promoting clean and renewable energy. Taking advantage of the connection between Hồ Chí Minh City and Cambodia to promote trade and services.

As for tourism: Developing agricultural eco-systems in the MRD as a foundation for tourism development, associated with coastal mangrove forest protection and development, and biodiversity conservation; developing fruit garden tourism... Attracting investment to develop supporting services. Strengthening vocational tourism service training, contributing to sustainable career transition for rural workers.

Promoting science, technology and international cooperation

Promoting scientific research, developing, transferring and applying technology, especially achievements of the industrial revolution 4.0 to agricultural production, industry and services gearing towards digital economic development, digital transformation based on potentials and strengths of the region. Shortly approving and implementing the Science and Technology Program for responding to climate change for the sustainable development of MRD in the period 2021 - 2025.

Proactively proposing, establishing and leading new cooperation frameworks to effectively mobilize investment, technology and knowledge support from development partners; sustainable exploitation and use of water resources, especially in Mekong sub-regions to ensure the benefits of Việt Nam. Prioritizing the promotion of cooperation activities on water resources within the framework of Mekong-Lancang Cooperation to reach an agreement with China on data and information sharing, especially information about the operation of hydropower dams and the discharge of water to downstream, ensuring the minimum flow of rivers at an appropriate level.

Human resource training and development

Strengthening high-quality human resource training programs to meet the trends of regional and international investment shift. Promoting career transition and job creation for agricultural and rural workers in the direction of specialization and professionalization, supporting farmers to become real agricultural workers, gradually moving agricultural workers to the service sector so that people can participate actively, acting as the center of production and livelihood transformation process, meeting the demand of economic development in the region■

NGUYỄN HẰNG

Release of implementation Plan for the Law on Environmental Protection 2020

The Law on Environmental Protection 2020 (Law No. 72/2020/QH14) was adopted at the 10th Session of the 14th National Assembly on November 17th, 2020. It will take effect from January 1st, 2022. The structure and content of the Law on Environment Protection (LEP) 2020 has breakthroughs that demonstrate the cross-cutting goal of protecting environmental components and people's health. Under this Law, environmental management instruments have been synchronized during the project's lifecycle from the stage appraisal of decisions on investment policies, the stage of project assessment, the stage of official operation to the termination stage, including national environmental protection strategy, environmental projection planning, strategic environmental assessment, preliminary environmental impact assessment, environmental impact assessment, environmental license and environmental registration.

Prime Minister (PM) issued the Plan to implement the revised 2020 by Decision No. 343/QD-TTg on 12th March, 2021 to ensure the timely, effective and synchronized adoption of such new policies.

The Plan aims to propagate and disseminate the LEP to all people, officials, civil servants and employees; raising awareness and responsibility of the people in compliance with the Law; assigning specific tasks, implementation schedules and responsibilities to the relevant agencies and units.

On that basis, the implementation Plan for the LEP has to reflect the unified direction of the Government and the PM; the close and effective coordination among concerned Ministries, ministerial-level agencies and units in implementing the Law. Furthermore, the Plan identifies the assignment within the scope of the respective duties as well as promoting the active roles of state management agencies at the Central and local levels. It also requires certain roadmaps for application from the time the Law takes effect across the country. It shall regularly and promptly inspect, urge and guide the implementation of the Plan to eliminate the arising obstacles and disruption to ensure the effective enforcement of the LEP. Accordingly, the Plan includes three core contents as follows:

Firstly, the Plan sets out the propaganda, dissemination, and training of the LEP.

The Ministry of Natural Resources and Environment (MONRE) shall assume the prime responsibility and coordinate with the concerned Ministries and ministerial-level agencies in compiling documents to serve the propagation and dissemination of the LEP. In addition, MONRE is also assigned to preside over and coordinate with the Vietnam Fatherland Front, Ministries and ministerial-level agencies and provincial people's committees in propagating and disseminating the LEP with appropriate topics and modes of communication to the people, officials, and civil servants. Besides, MONRE is in charge of chairing and coordinating with ministries and ministerial-level agencies and provincial people's committees to conduct training courses on the LEP and its' guiding documents for related individuals and organizations.

The people's committees of the provinces and cities directly under the Central Government shall organize the propaganda and dissemination activities in conformity with their practical conditions, for example, integration into the thematic conferences and training courses, updating new legal knowledge according to the legal dissemination and education work plan. The schedule for implementation starts from 2021 and onward.

Secondly, the Plan requires the review of legal documents

The MONRE reviews the current environmental regulations and technical regulations related to the LEP in the fields under its state management; implement or propose competent authorities to promptly amend, supplement, replace, abolish or issue new versions to ensure the compliance with the provisions of the Law in June 2021. Additionally, MONRE is assigned to synthesize all review results in July 2021.

Other Ministries, including Ministry of Industry and Trade, Ministry of Planning and Investment, Ministry of Agriculture and Rural Development, Ministry of Finance, Ministry of Construction, Ministry of Transport, Ministry of Health and ministerial-level agencies, people's committees of provinces and cities directly under the Central Government are also responsible for undertaking the review of regulations relevant to the LEP 2020 according to their state management domain and sending the results to MONRE in June 2021.

Thirdly, the Plan assigns the development and promulgation of legal documents guiding in details the implementation of the LEP.

The Minister of Natural Resources and Environment and other Ministers preside over the drafting, then submitting the competence authorities for promulgation or issuing according to their competence the sub-laws assigned in this Plan.

The Ministry of Justice and concerned Ministries, line Ministries are responsible for closely coordinating with the MONRE in the elaboration of legal documents that are assigned to MONRE according to the Decision. No. 2197/QD-TTg dated December 22nd, 2020, of the PM promulgating the List of sub-laws and decisions approved by the 10th Session of the 14th National Assembly and the assignment of the drafting agencies.

The people's committees of provinces and cities directly under the Central Government are in charge of reviewing, formulating, and promulgating within their jurisdiction or requesting the provincial people's councils to promulgate the legislative documents guiding in detail the LEP. It also requires the provincial people's councils under their competence to issue the legislative documents guiding in detail the LEP according to the List of this Plan.

To implement the Plan, the Ministers, heads of ministerial-level agencies and chairman of the people's committee of provinces and cities directly under Central Government within their management fields, shall actively and positively undertake the assigned tasks in the PM's Decision No. 2197/QD-TTg.

MONRE annually shall assume the prime responsibility for and coordinate with the Ministry of Justice in evaluating and monitoring the implementation of the LEP. The budget for the implementation of this Plan is allocated from the State Budget and other sources according to the provisions of Law. The Ministry of Finance and the People's Committee at all levels shall guarantee appropriate budgets to effectively implement the tasks of Ministries, line Ministries and localities.

Lastly, MONRE has responsibility for assisting the PM to monitor, urgent and guide other Ministries, people's committees of provinces and cities directly under the central government and relevant agencies in adoption of the tasks and compliance with the schedules that are stated in the Plan. Subsequently, MONRE also has a duty to synthesize and report to the PM on the results of the implementation of this Plan▪

TRUNG THUẬN - CHÂU LOAN

PART 1: PRODUCTION SECTOR/FIELD SELECTION AND APPLICATION ROADMAP

In Việt Nam, the concept of BAT has been included in the LEP 2020 and is defined as: "The best available technique is the best technical solution selected to ensure compliance with reality and effectiveness in pollution prevention and control, minimizing negative impacts on the environment" (Article 3: Interpretation of terms, amended LEP 2020). To implement BAT, identifying/clarifying the subject of BAT application is an urgent first step. The LEP 2020, Article 105, Clause 1 stipulates that: "The owner of an investment project, an establishment in the form of production, business or service that poses a risk of environmental pollution is responsible for researching and applying the best available techniques according to the roadmap set by the Government". Also, in the LEP 2020, Article 28 stipulates environmental criteria to classify investment projects into 4 groups corresponding to groups I, II, III, IV. In which, Group I is project with high risk of adverse impacts on the environment. However, the Law of Việt Nam does not stipulate that any of the 4 groups above must apply BAT, it is not clear about the relationship between groups and subjects applying BAT.

While in Russia, the Environmental Law 2015 clearly stipulates that industrial establishments in Group I must apply "Best technology-based standards". The Russian Decree 2015 also stipulates that the operators of factories in Group I must apply BAT. It is conceivable that BAT is developed for sectors with factories belonging to Group I. Russias' sectors of Group I are essentially similar to those listed in Annex I of the EU Industrial Emission Directive (2010). However, the list of these sectors also reflects the unique characteristics of the Russian economy and includes specific sectors such as oil, gas, coal and ore mining... Based on this classification, factories in Group I are required to apply for an integrated environmental license, in addition to being equipped with devices to automatically measure the volume and concentration of wastes as well as the technical means to transfer that information to a centralized environmental monitoring system. Up to now, the Federal Natural Resources and Environment Management Service is acting on behalf of businesses in collecting and analyzing data of the Federal Register System on factories in Group I.

It is necessary to identify who must apply BAT right from the Law, that helps people and businesses clearly define responsibilities and avoid disputes. In the United States, although their Environmental Law is not designed based on tech-

Some comments to the development of a Decree guiding the implementation of the Law on Environmental Protection 2020 regarding BAT

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The Ministry of Natural Resources and Environment (MONRE) is in the process of drafting a decree to implement the Law on Environmental Protection (LEP) 2020, which contains the contents related to Article 105, applying Best Available Techniques (BAT). There are 3 major issues being considered: (1) Sector/field selection and application roadmap; (2) BAT integration and decision-making procedures and (3) business support policies.

In order to pave the way for public opinion and to receive the opinions of scholars, researchers and businesses, this article will present and analyze each issue, Việt Nam's approach, international experience, problems that need more comments to complete.

nology, many of the programs that implement the Law are based on technology. These two regulations are closely related, such as the Clean Air Act explicitly states the pollutants and the sectors/fields that are likely to generate pollutants. Based on this, the new source program makes more detailed the level of discharge of sources as a basis for application of BAT.

In the EU, the list of sectors and pollutants is specified in Annex I, the Industrial Emission Directive (IED) 2010. To identify BAT applicants, industrial activities are grouped for information exchange. These groups must be approved by IED's Article 13 Forum. The thresholds to be considered vary in form, such as production capacity/time unit, level of operation... It should be noted that the IED does not define a threshold for the chemical sector, which means that all industrial-scale chemical plants must comply with the IED and key BREF References.

In South Korea, the selection of sectors for BAT development using statistical methodology and based on an environmental performance scoring system allows to identify the sectors with the greatest environmental impact. During the 2016 - 2021 period, South Korea selected 17 fields for the BREF drafting, listed in Table 2, along with publication dates and 3 target sectors.

For Việt Nam, experts say that "Establishments in the form of production, business and service likely to pollute the environment" as defined in Article 105 of the current LEP 2020 can be understood as 17 types of industrial production at risk of polluting the environment specified in Appendix IIa, Government's Decree No. 40/2019/ND-CP dated 13th May 2019. This can be confirmed in the content of the coming Decree.

However, not all businesses in the 17 production sectors mentioned above are required to apply BAT. In Russia, for businesses in the Group I, only 300 factories out of thousands of businesses have to apply for BAT integrated license. In South Korea, out of the total 40,000 industrial establishments, about 1,350 are classified as high-discharge and responsible for 70% of total industrial pollution. Separation of high-discharge groups was determined based on monitoring data and statistical analysis of South Korea.

To identify who complies with BAT regulations, experts and Law drafters need to review and develop Việt Nam's emission indicators as a basis for source classification. Source's potential to emit (PTEs) is the maximum capacity of a fixed source that can emit any air pollutant according to its design or physical configuration and operation. PTEs have many different thresholds, the PTEs indicator set also has to consider the regional perspective and many other specific conditions involved. The content of the indicator set will also be the content of the Decree on BAT that the drafting team is considering to include.

Table 1: EU BREFs, BAT Conclusions and REFs

Industrial sector/Activity	Types of document	Date of publication/Status
Ceramic manufacturing industry	BREF	August 2007
Common wastewater and waste gas treatment/ Management systems in the chemical sector	BATC, BREF	June 2016
Common waste gas treatment in the chemical sector		Drafting of BREF In progress
Emissions from storage	BREF	July 2006
Energy efficiency	BREF	February 2009
Ferrous metals processing industry	BREF	December 2001
Food, drink and milk industry	BREF	August 2006, January 2017
Industrial cooling system	BREF	December 2001
Intensive rearing of poultry or pigs	BATC, BREF	July 2017
Iron and steel production	BATC, BREF	March 2012
Large combustion plants	BATC, BREF	July 2017
Large volume inorganic chemicals - Ammonia, acids and fertilisers Large volume inorganic chemicals - Solids	BREF	August 2007
and other industries	BREF	August 2007
Large volume organic chemical industry	BATC, BREF	December 2017
Manufacture of glass		March 2012
Manufacture of organic fine chemicals		August 2006
Non-ferrous metals industries	BATC, BREF	June 2016
Production of cement, lime and magnesium oxide		April 2013
Production of Chlor-Alkali		December 2013
Production of polymers	BREF	August 2007
Production of pulp, paper and board	BATC, BREF	BATC September 2014, BREF 2015
Production of special inorganic chemicals	BREF	August 2007
Refining of mineral oil and gas	BATC, BREF	October 2014
Slaughterhouses and animal by-products industries	BREF	May 2005
Smitheries and foundries industry	BREF	May 2005
Surface treatment of metals and plastics	BREF	May 2005
Surface treatment using organic solvents	BREF	August 2007, October 2017
Tanning of hides and skins	BATC, BREF	February 2013
Textiles industry	BREF	July 2003, Review started
Waste incineration	BREF	August 2006, May 2017
Waste treatment	BREF	August 2006, October 2017
Wood-based panels production	BATC, BREF	November 2015
Economics and cross-media effects	REF	July 2006
Monitoring of emissions from IED-installations	REF	July 2003, revised June 2017

Source: BAT for Preventing and Controlling Industrial Pollution, EU 2017

Table 2: South Korean sectoral BREFs

Industrial secto /Activity	Status	Year of publication
Large combustion plants (Covers 2 sectors: Electric power and steam production)	Published	2016
Waste incineration	Published	2016
Iron and steel production	Published	2017
Non-ferrous metals industry	Published	2017
Large volume organic chemical industry (Covers 2 sectors)	Published	2017
Refining of mineral oil and gas	Formal draft completed	2018
Large volume inorganic chemicals	Formal draft completed	2018
Organic fine chemicals and special inorganic chemicals (Covers 2 sectors)	Formal draft completed	2018
Fertilizer industry	Formal draft completed	2018
Production of pulp, paper and board (Covers 2 sectors)	In progress	2019
Production of electronic parts	In progress	2019
Semiconductor industry	In progress	2019
Textile industry	In progress	2019
Plastic industry	In progress	2020
Food, drink and milk industry	In progress	2020
Slaughterhouses and animal by-products industry	In progress	2020
Auto parts and equipment manufacturing industry	In progress	2020

Source: BAT for Preventing and Controlling Industrial Pollution, EU 2017

One of the contents set out in the Decree on BAT this time is to determine the roadmap for BAT application in Việt Nam. In a study on BAT in 2020, the research team proposed a roadmap of steps to implement BAT in Việt Nam, including: Development of a legal framework on BAT (Adopted in November 2020); Decrees under the Law; Assignment of focal points; Establishment of TWGs (Technical Working Groups); Selection of subjects; Survey to collect technology information; Assessment and selection of BAT; Development of BAT reference profile; Approval and enforcement. According to the OECD assessment, it normally takes 4 years on average to fully implement this roadmap for a sector (39 months for BAT assessment and 12 months for consultation). This means, until 2025 Việt Nam can apply the BAT.

A shortened roadmap is being proposed, whereby some sectors can immediately apply international BAT regulations, shortening the time for survey and assessment. The LEP 2020, Article 105, Clause 3 states "… consider recognizing the BAT applied in the Group of industrialized countries permitted to be applied in Việt Nam". This provision gives Việt Nam immediate access to existing international regulations. In the roadmap for BAT application, according to the experience of other countries, Việt Nam also needs to identify groups of businesses that have priority in applying BAT.

In fact, BAT has been applied in a number of industrial sectors in Việt Nam due to the need of businesses to innovate technology, improve productivity and meet the requirements of international markets. However, most businesses currently do not understand BAT. Therefore, the development of specific guidance on BAT provisions in the amended LEP 2020 is very urgent, in which, priority should be given to selecting the production sector/field and the application roadmap▪

Law on Environmental Protection 2020: Strengthening responsibility in international integration and cooperation in the field of environment

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THE TREND OF INTERNATIONAL INTEGRATION AND COOPERATION ON ENVIRONMENTAL PROTECTION

International integration is the process of proactively accepting, applying and participating in the development of international laws and standards to serve the best interests of the nation. Broadly, international integration involves the acceptance, participation in the development and implementation of international standards, including: generally accepted institutions, laws, practices, principles and standards. These standards can be formed from the process of international cooperation, through agreements, between states or standards and practices set by non-governmental organizations and associations widely accepted by organizations and individuals in the world.

From the early 90s of the twentieth century up to now, Việt Nam's international integration on economics has gradually been expanded and developed on a larger and larger scale, covering almost all sectors of the national economy (trade, services, investment, industrial, agricultural, fishery production, intellectual property ...) with many diversified forms (unilateral, bilateral, multilateral). Two key contents of the integration process are: On the one hand, reforming the economics, innovating all areas of social life; on the other hand, implementing liberalization, opening markets, developing a business environment, increasing exchange of trade, investment, services ... with foreign countries.

Việt Nam has in turn participated in regional and international organizations, signed bilateral and multilateral economic agreements with many countries and organizations around the world. Up to now, Việt Nam has established diplomatic relations with 189 countries, economic relations with more than 224 countries and territories, of which relations with 30 countries as strategic and comprehensive partners (16 strategic partners and 14 comprehensive partners) and is a member of most important regional and international organizations with an increasingly enhanced position and role.

In recent years, in the implementation of guidelines and policies on strengthening international integration, especially international integration on economics, Việt Nam has had great achievements in all aspects of politics, economics, society, culture, education, diplomacy and security - defense ... Especially, achievements from the process of international integration on economics have contributed to the high and stable economic development of the country for a long time, step by step narrowed the development gap between countries. In addition to the process of extensive international integration on economics, international integration and cooperation in the field of natural resources and environment over the past time are also being promoted to meet the actual requirements and current trends.

So far, Việt Nam has joined and is a member of 28 multilateral international agreements related to natural resources and environment (MEAs), in which, especially the Free Trade Agreements (FTA) signed recently have strengthened the interactivity between policies on trade and policies related to the environment. International integration in general and in the field of natural resources and environment in particular has contributed to enhancing the role, position and reputation of Việt Nam for the international community, also bringing benefits in many aspects to the country in recent years. Nowadays, international integration in general, international integration and cooperation on environment in particular continue to evolve in a deeper trend in content and level and broader in scope and form. This trend of international integration and cooperation has brought

▲ *Minister of Natural Resources and Environment Trần Hồng Hà and members of the delegation of Việt Nam attended the United Nations Summit on Biodiversity 2019*

many benefits, opportunities and potentials to countries, but at the same time it creates challenges for developing countries like Việt Nam. Some of the main trends in international integration and cooperation in the field of environment can be generalized such as: Increasing scope, scale and extent, increasing legal obligations and levels; Diversity in contents and fields continues to form many international frameworks or "playgrounds" with many new "rules" on many geographical scales, from regional to global; Accountability requirements and demands increase with participation, accompanied by increased investment and financial contributions; The mechanism of evaluating and monitoring the implementation of committed obligations in the integration process is increasingly tight, accompanied by sanctions for non-compliance and implementation of committed obligations.

ADVANTAGES AND DISADVANTAGES, CHALLENGES IN INTERNATIONAL INTEGRATION AND COOPERATION IN THE FIELD OF ENVIRONMENT

International integration and cooperation in the field of environment took place early with the country's process of international integration, in which some contents over time have had quite deep integration such as conservation and biodiversity or wastes and chemicals. The process of international integration and cooperation on environment has basically met with the world's trends and is consistent with the country's development process, positively contributing to the process of developing institutions, policy and legal systems on environmental protection of Việt Nam. However, in addition to the positive aspects, international integration in the field of environment also faces difficulties and challenges related to awareness, financial and human resources, technical and technological skills and issues related to responsibilities as well as mechanisms and policies, in particular:

- Financial resources to invest in activities related to international integration on environment to meet the increasingly high practical requirements of the integration process are still limited, leading to passiveness and dependence on the external support sources, integration activities have not actually come into reality and the practical effectiveness is not high.

▲ *Minister Trần Hồng Hà spoke at the United Nations Summit on Biodiversity with the theme "Urgent action on biodiversity for sustainable development"*

- Human resources involved in management and implementation of international integration currently have many shortcomings in terms of quantity, capacity and experience due to the lack of long-term strategic investment in human resource training.

- The system of policies and laws in general in all sectors is still in the process of being improved, the coordination in the process of developing legal documents to internalize the committed international obligations still has limitations and inefficiencies, leading to overlap and conflict of contents between regulations or gaps in management, affecting the efficiency of enforcement.

- The coordination and collaboration mechanism between relevant agencies (Ministries, sectors) at the Central and local levels in the process of implementing and fullfilling international obligations and commitments has not been really effective, sometimes it is impractical leading to the status of effectiveness and efficiency in the implementation of international obligations to which Việt Nam has committed is not high.

- The trend of increasing commitments and obligations over time in international integration in general and international integration on environment in particular has created economic pressures and great challenges in the human resources needed to fulfill the committed obligations for developing countries, including Việt Nam.

- The current network of staff participating in international integration activities on environment is still concentrated domestically, mainly in the system of state management agencies of Việt Nam. In fact, there is no deep participation in the organizational system of management and operation of international frameworks, therefore the influence and initiative of Việt Nam in the current international frameworks related to the environment are still quite modest.

BASIC AND NEW POINTS ABOUT THE CONTENTS OF INTERNATIONAL INTEGRATION AND COOPERATION IN THE LAW ON ENVIRONMENTAL PROTECTION (LEP) 2020

Identifying the importance of international integration and cooperation in the field of environment to the nation's development, in recent years, guidelines, policies and laws on international integration and cooperation on environment have basically met the world's trends and in line with the country's development process. The LEP 2020 has been formulated with fundamental changes in its contents with many new policies, in which the contents of international integration and cooperation on environmental protection are specified in Chapter XII (Articles 155 and 156).

The LEP 2020 has overcome the limitations of the contents of international integration and cooperation of the LEP 2014. Specifically, the LEP 2020 has been adjusted and updated to suit the context, practical requirements on the management work and current international integration and cooperation trends. Major new points and changes include:

Title of the Chapter (International Integration and Cooperation on Environmental Protection), this is the first time that the term "international integration" has been officially prescribed into a specialized law to clearly distinguish the two activities and regulations related to international integration and cooperation.

Setting out principles to establish the legal framework and corridor to guide international integration and cooperation such as ensuring "implementation on the basis of equality, mutual benefit, strengthening synergy and enhancing the nation's position and reputation, respecting independence, sovereignty and territorial integrity, complying with the laws of each party, international law and commitments in international treaties and international agreements related to the environment ".

Combining international integration on economics and international integration on environment, in which international integration on environment aims to support and promote economic development. Also, setting out the principle of handling international disputes on environment that will be "resolved through peaceful means, according to international practices, laws and the laws of the parties concerned" to respond with the actual requirements of legally binding commitments and the application of sanctions for environmental related content in FTAs.

Dispute settlement provisions stipulate principles of dispute settlement by international practices, but still must ensure interests and in accordance with domestic law. This provision aims to avoid risks and disadvantages for Việt Nam when participating in future environmental dispute resolution.

The roles and responsibilities of the State, and responsibilities of organizations and individuals for international integration and cooperation activities on environmental protection are clearly defined. Strengthening international integration in general, including international integration in the field of environment, is the policy of the Party and State. Currently, international integration and cooperation on environment are taking place extensively, diversity in levels, contents and forms, involving Ministries, sectors and fields at different levels. The LEP 2020 clearly defines the responsibilities of management agencies, organizations and individuals, and clearly defines contents and scope of permission and encouragement in international integration and cooperation activities.

Contents and forms, modes of international cooperation are not restricted or regulated, provided that international cooperation activities on environmental protection are consistent with international and domestic laws. The purpose of this change and adjustment is to diversify contents, forms and methods, and encourage initiative and creativity in international cooperation. In other words, international cooperation activities on environment will not be prohibited and restricted without violating domestic and international laws.

The LEP 2020 also stipulates that the Ministry of Natural Resources and Environment is the focal point responsible for synthesizing and reporting on international integration and cooperation on environment. There are currently nearly 30 international treaties related to the field of environment. The management and implementation of international treaties are assigned to different ministries and sectors. The new regulation assigns the responsibility of the focal point to synthesize and report to ensure the consistency of the long-term orientation and strategy in the international integration and cooperation activities on environmental protection of the country in general▪

State and solutions for environmental protection in industrial clusters

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According to the Government's Decree No. 38/2015/ND-CP dated 24th April 2015 on management of wastes and scraps, industrial clusters (ICs) are collectively referred to as industrial zones due to their common characteristics as centralized production areas of many production, business and service establishments. However, because the formation of ICs is mostly not planned, mainly areas for localities to relocate production, business and service establishments that pollute the environment, or license to operate for types of businesses with local pollution risk. Therefore, established ICs are mostly small-scale (from a few hectares to several tens of hectares) and only within the scope of local management; They are not centralized production zones (industrial zones) established by Decision of the Prime Minister, so the planning for environmental protection and management entities in each locality for ICs is also very different. The production scale of investment projects in ICs is mostly small and medium, or only equivalent to the household size; facilities, technical infrastructure for transport and environmental protection in ICs are also limited. However, the important role of ICs in the socio-economic development and job creation of many localities can not be denied in recent years but are still worries about environmental protection in ICs.

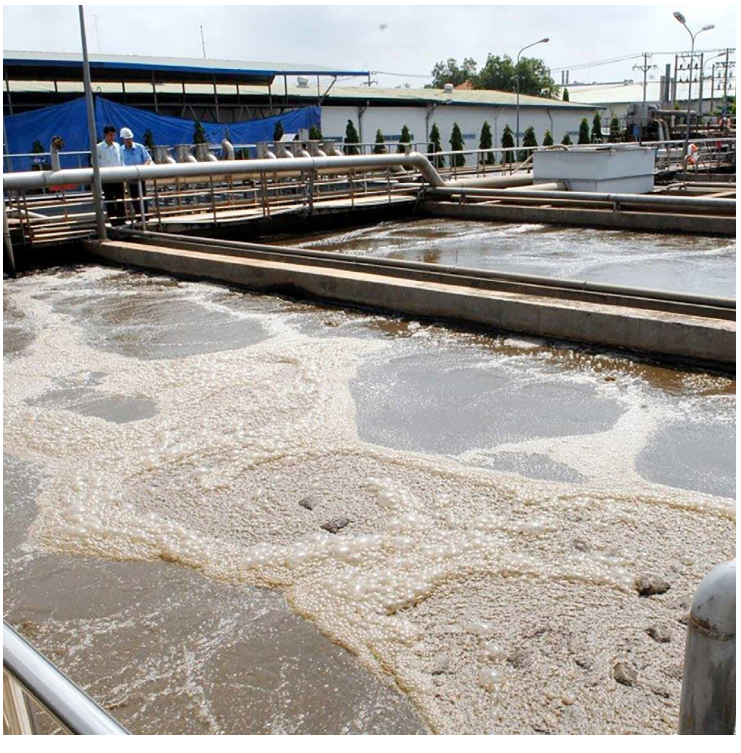
STATE OF ENVIRONMENTAL PROTECTION IN ICS

The process of environmental management in ICs recently showed that environmental protection in ICs is always a hot issue and difficult to solve, especially in ICs of craft villages (Phong Khê paper craft village IC, Bắc Ninh; Thái Phương textile-dyeing IC, Thái Bình...).

In general, ICs have the same shortcomings and limitations that need to be addressed and resolved:

First, lack of technical infrastructure planning for environmental protection. Because most ICs are formed to solve environmental problems, to ensure rapid relocation, instead of planning and investing in IC infrastructure, this very important stage is almost ignored. After ICs were filled, investment in infrastructure for wastewater collection, treatment and rainwater drainage was planned, making it difficult to implement. Many ICs, when formed, did not have infrastructure and were invested by businesses themselves, so they were quite fragmented and lack of consistency. Implementing the investment policy in technical infrastructure is difficult, many ICs are almost unable to perform, or only resolved in the direction of forced selection of technical infrastructure planning according to the current construction status, due to problems of compensation and site clearance, which are very complicated and expensive.

Second, there is no environmental impact assessment (EIA) report, this is a common situation in many ICs. Due to time pressure and lack of infrastructure investors from the beginning, most ICs in the past had no EIA, thus causing environmental consequences. Even some ICs have become hot spots of the local environment due to the concentration of many production establishments in one area but no EIA, ICs in an inappropriate location (In the inner city, town, near residential area…).



▲ *To solve the problem of wastewater treatment in ICs, there must be a comprehensive planning right from the beginning*

Third, treatment of wastes from ICs remains inadequate and limited. For centralized production zones, the biggest environmental problem is wastewater treatment, especially for ICs where establishments are generating a lot of wastewater. To solve the wastewater treatment problem, there must be a comprehensive planning from the beginning with the following stages: Connection - collection - treatment - discharge to the receiving source. However, doing this without planning right from the establishment of ICs is very difficult, this is why many ICs currently do not have a centralized wastewater treatment system.

Because most of production establishments in ICs are small-scale with outdated technology, economic efficiency is low, so the amount of generated wastes is large, which means the cost of waste treatment increases, therefore solid waste treatment and investment in gas emission treatment system are not paid attention, leading to many ICs being contaminated with solid wastes, industrial gas emissions.

Fourth, no zoning of functional subdivisions. In centralized production, business and service zones, the zoning of functional subdivisions is very important in order to eliminate the possibility that the types of production in ICs can interact, conflict on the environment, that make complaints. Because the zoning of functional subdivisions is only assessed and planned in the EIA, so without EIA, conflicts and interactions on the environment will arise when the projects in ICs are put into operation.

Fifth, environmental landscape is damaged, making it difficult to ensure the ratio of the area of green trees and grass. Because it was not planned from the beginning, the construction of transport infrastructure in ICs and the system of green trees, grass and auxiliary works along the internal roads of ICs was carried out in a patchy manner. The rate of green trees and grass cover is also low, according to the regulations of the Ministry of Construction, for centralized production zones, this rate used to be 20%, now it is prescribed not less than 10% of the area of ICs; However, due to lack of planning from the beginning, it is difficult for many ICs to reach this rate.

Sixth, there is no infrastructure investor for ICs. For centralized production zones, having an infrastructure investor means that the centralized production zone will be invested with a comprehensive infrastructure, including environmental infrastructure. Therefore, ICs without IC infrastructure investors will be managed by an IC Development Center, District IC Management Unit, District Construction Investment Project Management Unit. In some provinces, ICs are under the management of Department of Industry and Trade, or some ICs are under the management of Provincial Management Unit of Industrial Zones. The reason for ICs that have not yet had an infrastructure investor is mainly due to the relatively small area of ICs, investment is facing many difficulties, some newly established ICs have infrastructure planning, with investors, but all strive to be added to the planning and upgraded to industrial zones. The investment in IC infrastructure if only using the budget, but not from the source of socialization, will face many difficulties in the condition that the local budget is limited and the environmental protection in ICs will not be paid appropriate attention.

STRENGTHEN ENVIRONMENTAL PROTECTION IN ICS

To overcome shortcomings and limitations in environmental protection in ICs, in the coming time, key line agencies need to jointly implement groups of specific solutions as follows:

First, for existing ICs, it is necessary to have the drastic participation of people's committees at all levels in reviewing established ICs in the area to have a plan for investment in infrastructure of ICs through the completion of EIA; infrastructure planning, including plan for compensation and support for land clearance for investment in infrastructure of ICs completely and consistently. Suspend the planning of IC development instead of industrial zones, only license investment for new projects in ICs that have invested in complete infrastructure.

Second, promote the policy of socialization, attract investment in IC infrastructure instead of the state budget.

Third, increase communication, dissemination and strongly deploy the cleaner production program in production establishments in ICs; adopt policies to support the transformation of production technology towards modernization, energy saving and environmental friendliness.

Fourth, promote activities of inspection and investigation of responsibilities for environmental management of ICs and production establishments in ICs; special supervision is required for ICs that are hot spots and in urgent environmental conditions to step by step complete the requirements of environmental procedures for investment in ICs and waste treatment in ICs, or production establishments in ICs.

Obviously, industrial development has always been the backbone of the country's socio-economic development, including an indispensable role of ICs. In order to achieve the sustainable development goals, it is very necessary to have the drastic participation of the ministries, sectors and people's committees at all levels to strengthen the environmental management of ICs in the coming time■

Strengthening control of air pollution and promoting sustainable socio-economic development

LÊ HOÀI NAM - *Director*
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In the passing years, it has witnessed the increasing tendency in air pollution in many localities across the country, particularly in big cities such as Hà Nội and Hồ Chí Minh City (HCMC) that has seriously affected socio-economic development and public health. The main cause is dust, exhaust emissions from vehicles, construction activities and industrial activities with a large number of emissions which is not yet effectively controlled. In addition, the area of green trees and water surface in urban development has not met the requirements. The implementation of legal regulations, programs and tasks on air pollution control has not been synchronous and effective.

To enhance the control of air pollution, minimizing adverse impacts to people's health, and promoting economic - social development, on January 18th 2021, the Prime Minister (PM) issued Directive No. 03/CT-TTg on strengthening the control of air pollution. The Directive requires ministries, People's Committees of provinces and centrally-run cities to focus on promoting the implementation of programs and tasks of air quality management in accordance with the direction of the PM in Decision No. 985a/QD-TTg dated June 1st, 2016 approving the National Action Plan on air quality management up to 2020, with the vision towards 2025. In particular, from now to mid-2021, it is urgent to review and evaluate the enforcement of the regulations on dust and emissions control in industrial establishments and construction and transport activities under the respective scope of management; propose competent agencies to consider temporarily suspending or suspending the establishments causing serious environmental pollution by the laws.

EVOLUTION OF AIR QUALITY IN BIG CITIES

In the period 2016 - 2020, although the air quality varied from year to year, many cities, big cities and industrial areas have struggled with alarming air dust pollution. Particularly, particulate matter ($PM_{2.5}$ and PM_{10}) is the most concern in big cities like Hà Nội and HCMC. The level of fine dust pollution tended to increase from 2017 to 2019 and decrease in 2020. The results of air quality monitoring showed that most values of other parameters such as NO_2, O_3, CO, SO_2 were still within the allowable limits of QCVN No. 05:2013/BTNMT. In rural and mountainous areas, the air quality has remained relatively good and moderate.

The air quality index (AQI) shows that the air quality in Hà Nội City and some Northern cities, normally in winter, is poor or even very poor. In HCMC, the air quality also reaches low levels in the dry season. In Huế and Đà Nẵng cities, in general, the air quality remains good and moderate.

In Việt Nam, the air quality generally varies according to different regions and different seasons in a year. The average annual concentrations of PM_{10} and $PM_{2.5}$ in urban areas in the North are normally higher than in the Central and the South. The concentrations of PM_{10} and $PM_{2.5}$ in the Northern provinces fluctuate more sharply in winter with less rain, from September to March the following year (The observations are recorded at monitoring stations in Hà Nội, Phú Thọ, Quảng Ninh). On the other hand, the annual mean concentration of $PM_{2.5}$ and PM_{10} at all automatic air monitoring stations in Hanoi in the period of 2018 - 2020 exceeded the allowable limits compared to QCVN from 1.1 to 2, 2 times with the highest recorded in 2019. Meanwhile, in the cities in the South-Central Coast, typically Đà Nẵng and Nha Trang, the values of PM_{10} and $PM_{2.5}$ fluctuated slightly from month to month within a year. In the cities in the Southern region, the values of particulate matter had considerably increased in the dry season (from April to September) and decreased in the rainy season (from October to March the following year). In HCMC, the annual mean concentration of $PM_{2.5}$ was stable with a negligible variation.

The main cause is dust, exhaust emissions from vehicles, construction activities, and industrial activities with a large amount of emissions that are not yet effectively controlled. In addition, the area of green trees and water surface in urban development has not met the requirements. Data from the People's Committee of Hà Nội City shows

that there are more than 770,000 cars and nearly 5.8 million motorcycles in Hà Nội and about 700,000 cars and 7.5 million motorcycles in HCMC in use except for many vehicles from other localities that regularly travel into the city and the military vehicles used for public service purpose. Particularly, many old in-service vehicles do not meet circulation standards off the roads.

AIR QUALITY MANAGEMENT

Realizing the adverse effects of air pollution to the people's health and lives as well as on sustainable development, the Ministry of Natural Resources and Environment (MONRE), other Ministries, line Ministries, and localities have taken many measures to protect and improve air quality that has focused on the implementation of the tasks assigned in Prime Minister's Decision No. 985a/QD-TTg. There have been some initial achievements, specifically as follows:

Firstly, formulating, completing and implementing regulations on control of air pollution namely: (1) Stipulate responsibilities and some measures on air quality management in the Law on Environmental Protection (LEP) 2014 and the decrees guiding the implementation of the Law. Currently, the LEP 2020 which replaces the LEP 2014 promulgates new provisions on the responsibility of developing a National Plan for Air Quality Management and Provincial Air Quality Management Plan; direction of the implementation of emergency measures in case serious air pollution occurs across the inter-provincial, inter-regional and cross-border scale; assessment, monitoring and information disclosure on air quality; warning residential communities of and to take measures to remediate air pollution that impacts community health; National Action Plan on air quality management to 2020, with vision to 2025; Planning of national natural resources and environment monitoring network in the period 2016 - 2025, with a vision to 2030; (2) Request manufacturing, business, service establishments, and industrial zones that discharge large amount of waste and emissions to install automatic and continuous monitoring equipment and transmit data to local and Central environmental management agencies; (3) Develop and implement a number of programs and projects.

Secondly, strengthening information disclosure and advice on air pollution. There have been many positive changes in investment in monitoring activities and analysis of air pollution, especially in the big cities to provide warnings on air quality to the people and the community. Besides, the monitoring data, AQI, warnings and recommendations have been officially posted on the relevant websites. MONRE has regularly synthesized the results of monitoring and assessment of air quality to provide warnings and recommendations that have been officially posted on the website of the Vietnam Environment Administration (vea.gov.vn). The Vietnamese AQI (VN_AQI) has been also published on mobile apps. Furthermore, the air quality index recorded in the national monitoring stations has been updated and published 24 hours a day at the website cem.gov.vn. The Hanoi People's Committee has also announced and warned about air quality at the website moitruongthudo.vn.

▲ *Localities are requested to investigate all sources of air emissions in the first 6 months of 2021*

Thirdly, promoting communication activities, and raising public awareness about air pollution. Accordingly, the Government has directed the press agencies to participate in the propagation and dissemination of legislative documents, mechanisms and policies related to environmental protection and air quality management, and information on harmful effects

of air pollution and the benefits of using public transport to improve air quality. Besides, it also has directed the development of programs, topics, and thematic articles and reports to propagate, disseminate, and raise awareness and responsibilities of officials, public servants, and residents about air quality.

Fourthly, strengthening international cooperation in the field of air quality management. To illustrate, MONRE has cooperated with Japan and the Clean Air Asia (CAI-ASIA) to study and propose solutions to reduce air pollution and CO_2 emissions in Việt Nam; worked with international organizations such as Japan Industry Association, World Bank, JICA... to organize seminars to strengthen the capacity of localities and managers at relevant ministries and line ministries on air pollution control. Particularly, Hà Nội City has cooperation with the World Bank to take samples and analyze the chemical composition of the fine particulate matter $PM_{2.5}$ to determine the current status of the City's air pollution; working with the non-governmental organization C40 in updating and building the framework of the 3rd Climate Change Response Plan; working with the International Council for Local Environmental Initiatives (ICLEI) on public consultation, creating relationships between state management agencies and relevant organizations and individuals in reduction of greenhouse gas emissions and improvement of quality of climate and working with the German Corporation for International Cooperation (GIZ) in the research on assessment of the impacts of traffic on the air quality.

The localities have also gradually improved the air quality in their management areas: Developing and implementing the local air quality management plan; strengthening inspection and examination of the compliance of the establishments generating emissions with the regulations on environmental protection; improving state management capacity of air environment protection; building the necessary infrastructure for the transmission of industrial emissions data from the establishments that have installed automatic and continuous monitoring systems to the Department of Natural Resources and Environment and MONRE. In particular, Hà Nội City and HCMC have synchronously deployed many measures, including the issuance of related directives and regulations, and implementation of technical solutions to control emission sources from traffic and industrial activities.

On the other hand, there have been some existing shortcomings and restrictions in air quality management. For example, air pollution has become more serious in some areas and some periods. The resources, including organizational structure, human and financial resources, to perform the tasks of air quality management and the monitoring and information disclosure of air quality has not met the practical requirements. The public investment in the construction, installation and maintenance of continuous and automatic air monitoring stations has not been comparable with the socio-economic development and the need for practical management. The responsibilities for the management of air pollution in big cities and densely populated areas have not been identified. Besides, the awareness of the people and businesses about air environmental protection is not high. Many construction and traffic works have not met environmental requirements. At the same time, the burning of waste and post-harvest by-products and littering have still occurred.

CONTROL AND FORECAST OF THE EVOLUTION OF AIR QUALITY BY 2025

To take urgent and immediate measures to control and minimize negative impacts on the air environment, the PM assigned specific tasks to each Ministry, line Ministry and locality as follows:

MONRE: To evaluate the implementation results of Decision No.985a/QD-TTg, proposing a plan for air quality management in the period 2021 - 2025 and then reporting to the PM in the first quarter of 2021; To strengthen the effective management and implementation of monitoring programs, strictly control the quality of monitoring of the air environment, disclose the monitoring results and promptly warn air pollution for the residents.; To immediately invest in and increase the capacity of air quality monitoring under the master plan on national environmental monitoring, ensuring that the evolution of air quality in urban areas and regions across the country shall be controlled, warned and forecasted by 2025; To focus on reviewing and completing the system of national environmental technical regulations and standards for industrial emissions and emissions from road motor vehicles to approach those of the developed countries in the world. To review and report to the PM the implementation of the roadmap for the application of national technical regulations and standards for emissions from road motor vehicles. The tasks shall be completed in the fourth quarter of the year 2021;

To take the lead in developing, issuing criteria, and certifying eco-labels for environmentally friendly transportation products, vehicles and services; To assume the prime responsibility for, and coordinate with other Ministries, line Ministries and localities to review legislative documents on air environment protection, thereby completing, within its jurisdiction, or proposing to competent state agencies to complete regulations and policies on air pollution control.

Ministry of Transport: To urgently elaborate national programs and schemes on the development of environmentally friendly transport and public transport system, including electric vehicles and then submit them to the PM and the Government. To promote propagation activities and encourage people to use public and environmentally friendly transports. To adopt the roadmap for the application of national environmental technical regulations for transport emissions. To guide and closely monitor the implementation of environmental protection measures, especially effective solutions to prevent, limit and minimize dust and emissions in road construction activities.

Ministry of Industry and Trade: To promote pollution control over the projects and the establishments that generate a large amount of waste and potentially cause environmental pollution, namely thermal coal, petroleum, steel, chemicals and fertilizers, mineral processing and exploitation, etc. To research and develop policies to encourage and support enterprises to use clean energy and environmentally friendly technologies and efficiently use natural resources in production. To review and assess the capacity to manufacture, import, and supply fuel for motor vehicles following technical regulations and the roadmap for application of national emission technical regulations and standards to road motor vehicles in Việt Nam and then report to the PM before June 2021. To direct the implementation of additional power development planning of the provinces and cities to satisfy the needs for the development of vehicles using electricity. To study and develop regulations and standards for imported coal (the allowable standard limit for ash and sulfur content) to comply with environmental protection requirements. To propose policies on exploitation, processing and importing of raw materials (lithium, cobalt) to produce batteries for electric vehicles.

Ministry of Construction: To guide and inspect the enforcement of regulations and measures to control dust and emissions in construction activities and the implementation of urban planning to ensure that the areas of urban green space and water surface meeting the requirements of relevant regulations and standards.

Ministry of Agriculture and Rural Development: To directs and guide the implementation of the collection, treatment and processing of post-harvest by-products into useful products. To strengthen propaganda to farmers to properly handle their agricultural by-products in compliance with environmental protection regulations instead of burning.

Ministry of Science and Technology: To develop and promulgate national technical regulations on fuels towards reducing emissions of air pollutants under the roadmap for application of national environmental technical regulations on vehicle emissions. To support and invest in scientific research activities on the management and control of air quality.

Ministry of Health: To study, assess and warn the risks of air pollution to public health and then propose measures to protect public health, priority to large urban areas and areas that have many sources of emissions with a high risk of pollution. To direct and inspect the implementation of the monitoring of impacts from the health sector's activities on the air environment. To increase control of air pollution from medical waste incinerators.

Ministry of Finance: To take the lead in reviewing and guiding the implementation of preferential and supportive policies on environmental protection according to the provisions of the Law on Environmental Protection 2020.

Ministry of Public Security: To direct the investigation and strictly handle environmental law violations causing serious air pollution.

Also, other ministries, including the Ministry of Information and Communications, MONRE, Vietnam Television, the Voice of Vietnam, people's committees of provinces and cities directly under the central government, and press agencies promote communication and propaganda about the air quality, measures to prevent air pollution. To promptly provide information and warnings about air quality, the negative impacts and risks of air pollution to human health, and organizations and individuals that cause serious air pollution. To use information about air quality provided by competent authorities; strictly handle cases of spreading false information or causing confusion in the public by the laws.

In particular, the People's Committees of Hà Nội, HCMC, and other provinces and cities at high risk of air pollution: Strictly implementing the development and implementation of the local quality management plan in accordance with the PM in Decision No. 985a/QD-TTg. To direct the adoption of response measures in case the air is seriously polluted in the area under their management. To implement the inventory of emission sources, monitoring, and evaluation of particular matter pollution (PM_{10}, $PM_{2.5}$). These tasks shall be completed before December 31st, 2021. To develop and implement the planning of the local quality monitoring network. To allocate resources for investment, additional installation and increasing the number of continuous automatic air quality monitoring stations; regularly organizing the local periodic air quality monitoring programs; promptly updating and providing information on local air quality control to the public. To speed up the promulgation and implementation of the public transport system development plan, giving priority to vehicles using clean energy; withdrawing and eliminating old motor vehicles which use out-of-date technologies and do not meet the on-road standards. To develop non-motorized transportation; encouraging people to use public transport and promoting propaganda on the use of environmentally friendly transport…▪

Issue the Plan on implementation of the Directive on strengthening air pollution control

In order to concretize the contents required and instructed at the Prime Minister's Directive No. 03/CT-TTg dated 18th January 2021 on strengthening air pollution control assigned to the Ministry of Natural Resources and Environment (MONRE) in coordination with the ministries, sectors and the People's Committees of the provinces and centrally-run cities as well as assigned specific works to the units, on 17th March 2021, the Minister of Natural Resources and Environment signed the Decision No. 461/QD-BTNMT on the Ministry's Plan on implementation of the Directive No. 03/CT-TTg.

Accordingly, the Minister suggested relevant units under the Ministry to proactively implement, ensure the quality and progress of the main contents: Organize the evaluation of the results from implementation of the Decision No. 985a/QD-TTg, propose a plan on air quality management in the period 2021 -2025; Strengthen the management and organization for implementation of air quality monitoring programs to ensure efficiency, strictly control quality in monitoring the air environment, publish monitoring results and promptly report air pollution to the community; Expeditiously develop and implement the investment and increase the capacity of air environment quality monitoring in accordance with the master plan on national environmental monitoring, ensure that by 2025, air quality developments in urban centers and regions must be controlled, warned and forecasted.

Along with that, review and complete the system of national environmental regulations and standards on gas emissions of industrial facilities, road motor vehicles circulating in Việt Nam, quality of the ambient air close to the standards of the advanced countries in the world; Review and report to the Prime Minister on the implementation of the roadmap for application of national technical standards and regulations on gas emissions of road motor vehicles circulating in Việt Nam; Develop and issue eco-label criteria and certification for environmentally friendly transport products, vehicles and services; Review legal regulations on air environment protection, complete according to its competence or propose to competent state agencies to complete legal regulations and policies on air pollution control. Also, coordinate with the Ministry of Finance to review and guide the implementation of incentive policies on environmental protection according to the provisions of the Law on Environmental Protection 2020; Promote information and propaganda on air quality and measures to prevent air pollution; Establish an interdisciplinary mission on air pollution control with focus on air pollution hotspots in the country; Synthesize and report the results from implementation of the Directive.

The Minister also assigned the Vietnam Environment Administration as the specialized unit to assume the prime responsibility for, and coordinate with the line ministries, sectors, local authorities and units directly under the Ministry to organize the implementation of the plan contents. Prepare documents for the MONRE to request the Ministry of Transport to appoint a focal point to coordinate reviewing national technical standards and regulations on gas emissions of road motor vehicles, the roadmap for the application of the issued standards on gas emissions of motor vehicles to propose amendments, supplements and finalization and report to the Prime Minister for decision▪

BẢO BÌNH

Prime Minister orders intensifying air quality control measures

Prime Minister (PM) Nguyễn Xuân Phúc has asked Ministries and People's Committees of centrally-run cities and provinces to step up the implementation of programs and tasks on air quality control. The move aims to intensify the control of air pollution, ease its impact on people's health and spur socio-economic development.

In a recently-issued Directive No. 03/CT-TTg, the PM emphasized the need to review Law enforcement and the control of dust and emissions at industrial facilities as well as from transport and construction activities. The PM also ordered the suspension of the facilities that cause serious environmental pollution.

The Directive pointed out the worsening air pollution in many localities nationwide, affecting socio-economic development and the public's health, mainly due to dust and emissions by vehicles and constructional and industrial activities that are responsible for huge emissions yet to be controlled effectively.

Moreover, tree coverage and water surface areas in urban development have not yet satisfied requirements, the document said, highlighting shortcomings in the implementation of relevant laws, programs and tasks.

The PM asked the Ministry of National Resources and Environment (MONRE) to assess the realization of the decision dated June 1st, 2016, approving the national action plan on air quality control by 2020, with a vision towards 2025, and the proposal on air quality control plans for 2021 - 2025. The Ministry needs to enhance its management and organization of air quality monitoring programs, announce results and swiftly issue warnings of air quality to the public. The PM also tasked the MONRE with completing national standards for emissions of industrial activities and vehicles.

Meanwhile, the Ministry of Transport must promptly put forth national programs and projects on the development of means of transport and the environmentally friendly public transport system; The Ministry of Industry and Trade was asked to strengthen its inspections over projects and factories with huge discharges that may cause environmental pollution, while devising policies in support of businesses using clean energy and environmentally-friendly technologies; The Ministry of Construction needs to guide and inspect the implementation of regulations and measures for dust and emission control in constructional activities, along with urban planning, with tree coverage and water surface area ensured; The Ministry of Agriculture and Rural Development is in charge of supervising the collection and treatment of waste and the processing of post-harvest by-products, while enhancing the communications work.

▲ *Dust particles threaten life in Hà Nội, Hồ Chí Minh City*

The PM asked the Ministry of Science and Technology to issue national technical standards for fuels and support relevant scientific-technological research studies. He urged the Ministry of Health to assess the impact of air pollution on the public's health and propose measures for public health protection, while the Ministry of Finance was requested to inspect the implementation of incentive policies on environmental protection in line with the Law on Environmental Protection 2020. The Ministry of Public Security was requested to investigate and seriously handle violations of relevant laws.

The PM said cities and provinces need to build and roll out planning schemes on local air quality monitoring networks and push ahead with the issuance and realization of plans on public transport development. Vehicles that use clean energy should be prioritized, stressing the need to revoke and terminate old and outdated vehicles. The localities should urge construction and transport project investors and constructors to seriously observe environmental protection measures and encourage production facilities to revamp outdated machines▪

CHÂU LONG

Talk with "author" of Formosa Hà Tĩnh Ecological Park

▲ *Prof. Dr. Nguyễn Việt Anh - Director of IESE, NUCE, Vice Chairman of Vietnam Water Supply and Sewerage Association at the Vietnam Environmental Awards Ceremony*

Prof. Dr. Nguyễn Việt Anh is an expert in water and wastewater treatment technology, author of hundreds of articles that have been published in prestigious domestic and international journals, towards issues that are of concern to science and practice such as: Research on treatment of sewage sludge, septic sludge, organic solid waste, collection of biogas for energy production; Research on resource recovery from urban waste streams; Research on collection, treatment and supply of rainwater for poor communities; Decentralized, low-cost wastewater treatment... Many researches and patents of the Professor have been successfully transferred and applied in practice. On the occasion of the Ministry of Natural Resources and Environment's (MONRE) organization of the 5th Vietnam Environmental Awards Ceremony, the Vietnam Environment Administration Magazine (VEM) had a talk with Prof. Dr. Nguyễn Việt Anh - Head of Water Supply and Sanitation Division, Director of Institute for Environmental Science and Engineering (IESE), National University of Civil Engineering (NUCE) on a number of scientific research achievements in practical applications, including the research on Formosa Hà Tĩnh Ecological Park.

VEM: *Congratulations you have just been awarded the 5th Vietnam Environmental Award by the MONRE for your great contributions to the cause of environmental protection! What does the award mean for the scientific research and teaching activities that you are pursuing?*

Prof. Dr. Nguyễn Việt Anh: Environmental protection is everyone's duty. Therefore, in order to keep the environment clean for sustainable development, all must make joint efforts. In everyday life, there are always many practical activities, many bright examples and countless people making silent but meaningful contributions to the society. I myself is just an individual with the daily jobs attached to the profession, with responsibility, enthusiasm and passion only. I am very happy to be recognized and awarded by the Board of Judges and the MONRE. This is a timely encouragement for me and my colleagues to continue to dedicate to environmental protection work. I hope this award will inspire and motivate young colleagues and students of the NUCE to follow the chosen professional direction.

VEM: *Obviously, for decades, many published researches and patents of Professor in the field of environment have been transferred and applied successfully in practice. Could you please tell us about some research topics that have been deployed in the past time?*

Prof. Dr. Nguyễn Việt Anh: During the past 25 years, I and the lecturers, researchers of the IESE, the NUCE have continuously specialized in and contributed to a number of researches of practical value. In which, there are 3 products of science and technology that my colleagues and I have spent a lot of efforts to complete, specifically:

Lagoon process to control incidents caused by industrial wastewater: This solution has been developed since the marine environmental incident in some Central provinces in April 2016. This model both allows the storage of wastewater for re-treatment when an incident occurs and at the same time improves the water quality after the wastewater treatment plant, before being discharged into the sea and contributes to the improvement of regional landscape, ecology and is the place of verification and supervision of the wastewater management activities of enterprises selected by Formosa Hà Tĩnh Company (Hà Tĩnh Province) and allowed by state management agencies.

This is the first lagoon system combined with a large-scale plant-based water filtration in Việt Nam in an area of 10 hectares, designed with function of incident and biological indicator control and additional wastewater treatment having modern equipment that works flexibly: incident wastewater storage tanks and sewage circulation pumps for retreatment with automatic monitoring system, SCADA and remote-controlled camera, chain of lagoons with circulating piping system, biological indicator aquariums, flora in filtration yards... We designed and constructed based on the professional knowledge and experience accumulated through decades of works.

After 3.5 years of operation (from July 2017) up to now, the system has been working very stably. The water quality through the lagoon system and the plant-based water filtration is improved (always much lower than the limit value). The lagoon system works well, reduces the work pressure on the operators and managers of the wastewater treatment plants. With the practical efficiency of the system, Formosa Ha Tinh Company named this work as "Formosa Hà Tĩnh Ecological Park". To date, the work has had over 10,000 visitors coming from local residents, students, domestic and international delegations. This solution also has been granted the Patent No. 21386 by the Intellectual Property Office of Việt Nam. Many enterprises, production establishments, industrial parks have referenced this model to apply for economic and environmental protection efficiency.

Decentralized, low-cost wastewater treatment solution for residential areas: Realizing that decentralized wastewater treatment is an important solution in places where the model of centralized wastewater drainage and treatment has not yet applied, or applied inappropriately, especially in developing countries, single works, suburban residential area, rural areas... Since 1998, my colleagues and I have successfully explored, researched and developed different models of decentralized wastewater treatment, typically the baffled septic tanks with anaerobic filters (BASTAF), BASTAF tank combined with aerobic treatment (BASTAFAT), BASTAF tank and plant-based water filtration, AFSB wastewater treatment tank, models of low-cost, hygienic latrines, pre-fabricated composite modular and pre-fabricated reinforced concrete wastewater treatment tanks.

To date, decentralized wastewater treatment solutions using BASTAF, BASTAF + plant-based water filtration, BASTAFAT have been widely recognized, applied and included in the legal documents of the State such as Circular No. 04/2015-TT-BXD guiding the implementation of the Government's Decree No. 80/ND-CP on sewerage and wastewater treatment. In addition, hundreds or thousands of works have been applied in practice to schools, health care facilities, poor rural households, condominiums, tourist resorts... such as: Tomb of General Võ Nguyên Giáp (Vũng Chùa, Quảng Bình); K9 historical relic (Đá Chông, Ba Vì, Hà Nội); Tây Thiên relic area (Tam Đảo, Vĩnh Phúc); National University of Civil Engineering; Cát Bà Tourist Island Pier (Hải Phòng); Residential - Office at 12 Thụy Khuê (Hà Nội); Vicostone Hòa Lạc Factory (Hà Nội); Villas in the campus of Vietnam National Convention Center (Mỹ Đình, Hà Nội)... Recently, we continue to improve and develop systems of decentralized wastewater treatment tanks powered by solar energy, with remote on-line control; model of septic tanks using microbiological preparations, allowing flushing with seawater; model of dry latrines, separating urine, composting microbiological fertilizer ... deployed for army units stationed on islands of Vĩnh Thực, Cô Tô (Quảng Ninh), Cát Bà (Hải Phòng). The treatment tanks are made of composite modular form, which are flexibly assembled and transported to the islands. Obviously, the research team has taken the lead and made important contributions to promoting the application of decentralized wastewater treatment solutions in Việt Nam. Anaerobic wastewater treatment system and procedure in combination with aerobic BASTAFAT have been granted Patent No. 9957 by the Intellectual Property Office of Việt Nam.

Rainwater collection solution for residential areas: With the need for solution to supply clean water for daily life and drinking of people in rural areas, where water sources are scarce, surface water, and ground water are polluted, we have developed a rainwater collection, treatment, storage and use model, with the solution of automatic rainwater separation, filtration and disinfection to treat rainwater into drinking water directly, that has automatic control and online monitoring.

Some projects have been implemented such as: Rainwater collection and treatment system, that supplies drinking water directly to pupils at 2 primary and secondary schools in Đại Cương Commune, Kim Bảng District, Hà Nam Province; Phương Nại Pagoda, Yên Mô Commune, Yên Nhân District, Ninh Bình Province; Medical Center of Lý Nhân District, Hà Nam Province; rainwater systems installed for primary schools in districts of Nam Từ Liêm, Thanh Trì (Hà Nội), Sa Pa District (Lào Cai)… These models have contributed to solving the water shortage for drinking, living in rural, remote and isolated areas, helping poor households and rural pupils have safe drinking water, also raising awareness, improving health status and living conditions. Thousands of pupils and the poor rural people have benefited and the model is continuing to replicate.

▲ *Formosa Hà Tĩnh Ecological Park with lagoon process to control incidents*

▲ *Systems of decentralized wastewater treatment tanks powered by solar energy, deployed for army units on islands*

▲ *Rain water system supplying drinking water directly to Phương Nại Pagoda (Ninh Bình Province)*

VEM: *Recently, the Law on Environmental Protection 2020 has been passed by the National Assembly and is about to be put into practice, so as a leading expert in the field of water and wastewater treatment technology... What are your suggestions to improve the legal policy on environmental protection in the coming time?*

Prof. Dr. Nguyễn Việt Anh: We are in the stage of rapid economic development, with great challenges in environmental pollution, degradation and depletion of natural resources. Therefore, without drastic policies, implementing consistent and thorough solutions for pollution control and environmental protection, the environment and natural resources will continue to be damaged and the cost of restoration will be extremely high, not even possible. Over the past 25 years, we have invested nearly 3 billion USD in urban wastewater collection and treatment, mainly with ODA loans, but only treated about 15% of the generated wastewater. If at the current rate, it will be a long time before we can control pollution caused by urban wastewater. Additionally, there are still millions of cubic meters of industrial wastewater, also from craft villages, rural areas... Therefore, it is necessary to have appropriate and feasible mechanisms to mobilize other resources, especially from the private sector in order to quickly increase the coverage of drainage and wastewater treatment services. Attention also should be paid to the connection and responsibility of the dischargers to the urban drainage system. For regional development and urban development planning, it is necessary to implement principles of integrated water resource management and apply appropriate water drainage and wastewater treatment organization solutions. Sustainable approaches that bring economic benefits such as integrated waste management, resource recovery and circular economy should be encouraged, brought to life soon, through appropriate policies. Development planning needs to have a long-term, consistent vision, and step-by-step implementation must be sure and effective. We conducted a study with the World Bank evaluating 17 sanitation improvement projects in Việt Nam. The results show that, for every 1 USD spent on sanitation, the direct and indirect benefits are between 4 and 11 USD, while the annual loss due to poor sanitation in Việt Nam is equivalent to about 1.3% of GDP, so it is necessary to give priority to investment in this field. We are currently working with the Vietnam Environment Administration, the MONRE on a number of professional contents towards the implementation of the Law on Environmental Protection 2020 and will continue to contribute our best to these meaningful works.

VEM: *In your opinion, what policies are needed to link research results with practical application in enterprises?*

Prof. Dr. Nguyễn Việt Anh: In the field of environmental protection, the biggest gap between scientists and enterprises, in my opinion, is the stage of completing research results of scientists and enterprises' investment in technological solutions researched and developed. Currently, many technological solutions have potentials, but have not found the path from the laboratory to practical application, because research institutions are often not eligible to deploy at pilot, semi-industrial scale to fully assess the cost benefit factors, product life cycle... Meanwhile, enterprises are not motivated to invest in research and development (R&D), including waste treatment in the context of technology market that is being "real and fake that make confused", there is also a lack of arbitration units to assess, evaluate technology, protect copyright. Besides, there is the thought of "foreign preference", dealing in waste treatment, environmental protection, or doing just for immediate benefits... In my opinion, an effective solution to overcome this problem is key investment policy, that correctly identifies and focuses on potential researches and practical application. Scientists, research bases, especially applied sciences, need to know how to cooperate with enterprises and local authorities. On the contrary, local authorities and enterprises need to have goodwill to cooperate with capable scientists and professional units to place orders to solve their specific problems.

VEM: *Sincerely, thank you!*

PHẠM ĐÌNH

Control of air pollutant emissions from road motor vehicles

VŨ HẢI LƯU

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Road motor vehicles, including cars, motorcycles and motorbikes are one of the main emission sources for several air pollutants such as carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), particulate matter (PM) and other toxins like benzene... Such air pollutants are mainly distributed in urban areas that directly affect people's health and contribute to about 22.6% of CO_2 causing the greenhouse effect. Recently, the Ministry of Transport (MOT) has developed and implemented a range of policies to enhance the improvement of air quality. Currently, in Việt Nam, the control of air pollutant emissions from road motor vehicles has been conducted synchronously from the stages of manufacturing, assembling, and importing to the stage of emission control of vehicles in circulation.

CONTROL OF AIR POLLUTANT EMISSIONS FROM NEW MANUFACTURED, ASSEMBLED AND IMPORTED ROAD MOTOR VEHICLE

The control of air pollutant emissions from manufactured, assembled and imported road motor vehicles have been implemented since 2007 under Decision No. 249/2005/QD-TTg of the Prime Minister. Accordingly, for motor vehicles that are manufactured, assembled, or imported as brand - new ones, the emission standard limit according to the Vietnamese standard equivalent to the Euro 2 limit must be applied from January 1st, 2007. As a result, the control has created technical barriers to prevent the backward road motor vehicles that generate high emissions and cause environmental pollution.

Subsequently, the MOT assessed the results of the implementation of Decision No. 249/2005/QD-TTg and then submitted to the Prime Minister to promulgate the Decision No. 49/2011/QD-TTg dated September 1st, 2011, providing the roadmap for application of exhaust emission standards to manufactured, assembled and imported brand-new cars and motorbikes. Under this Decision, motorbikes are subject to level - 3 exhaust emission standards and cars using petrol and other fuels except for diesel oil are subject to level - 4 exhaust emission standards from January 1st, 2017. Besides, cars using diesel oil are subject to level-4 exhaust emission standards from January 1st, 2018. Manufactured, assembled and imported brand-new cars are subject to level-5 exhaust emission standard from January 1st, 2022.

In comparison with other ASEAN countries, only Singapore has applied Euro -6 limits since 2017. Thailand and Indonesia issued the roadmap in which the Euro-5 limits would be applied from 2022 and 2030 respectively. Nevertheless, in the recent Regional Conference on Harmonization of Standards, both two countries postponed their deadlines without specific time. It can be seen that the application of the level-5 exhaust emission standard from January 1st, 2022, demonstrates the Vietnamese Government's commitment to reducing pollutant emissions, protecting the environment and the people's health.

CONTROL OF AIR POLLUTANT EMISSIONS FROM IN-SERVICE AND IMPORTED SECOND-HAND ROAD MOTOR VEHICLE

According to the Prime Minister's Decision No. 249/2005/QD-TTg, the control of air pollutant emissions from in-service and imported second-hand road motor vehicles has been implemented for cars since 2006. The implementation of the Decision has contributed to the raising awareness and responsibility of the owners of vehicles in the maintenance to reduce air pollutant emissions when using.

To enforce Decision No. 985a/QD-TTg dated June 1st, 2016 of the Prime Minister approving the National Action Plan on the management of air quality, MOT assessed results and submitted to the Prime Minister to issue Decision No. 16/2019/QD-TTg dated March 28th, 2019 providing the roadmap for application of exhaust emission standards to in-service and imported second-hand cars. Accordingly, the permitted maximum emission limits are higher than that are stipulated in Decision No. 249/2005/ QD-TTg.

Roadmap for application of emission standard limits to in-service automobiles:

For in-service automobiles which are fitted with spark-ignition engines or compression ignition engines and manufactured before 1999, level-1 must be continued to apply.

For in-service automobiles which are fitted with spark-ignition engines or compression ignition engines and manufactured from 1999 to 2008, level - 2 must be applied from January 1st, 2021.

For in - service automobiles which are fitted with spark-ignition engines or compression ignition engines and manufactured after 2008, level - 2 must be applied from January 1st, 2020.

Roadmap for application of emission standard limits to imported second-hand automobiles: For imported second-hand automobiles which are fitted with spark-ignition engines or compression ignition engines, level-4 must be applied from the effective date of Decision No. 16/2019/QD-TTg.

To implement the Prime Minister's Decision No.16/2019/QD-TTg, MOT has directed their agencies and units to supplement and revise the regulations on safety inspection and environmental protection for in-service automobiles; improving the qualifications and equipment of the registry units; integrating the updated emission standard limits and the application roadmaps into the inspection

Table 1. Permitted maximum emission limits of road motor vehicles

Pollutants in the exhaust gas	Vehicles fitted with spark-ignition engines						Vehicles fitted with compression ignition engines			
	Automobiles				Motorcycles					
	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 1	Level 2	Level 3	Level 4
CO (% volume)	4.5	3.5	3.0	0.5 0.3 (3)	4.5		-	-	-	
HC (ppm volume) 4-stroke engine 2-stroke engine Special engines (1)	1.200 7.800 3.300	800 7.800 3.300	600 7.800 3.300	300 200 (3) 7.800 3.300	1.500 10.000 	1.200 7.800 				
Lamas (λ)				0.97- 1.03 (3)						
Smoke opacity (% HSU) (2)							72	60	50	45

1) Special engines include Wankel engines and a number of other engines with special structures different from those of piston engines which are widely used.
2) The smoke opacity limit may also be determined from light absorption coefficient values (m- 1) equivalent to the above opacity values.
3) Apply the accelerated idle speed measurement procedure according to TCVN 6204:2008 (ISO 3929: 2003).

procedures; propagating and disseminating the application roadmaps to automobiles importers, owners, and drivers; organizing and mobilizing resources for research and pilot application of emission treatment technologies to develop mechanisms and policies, and to finalize the system of standards and technical regulations and improve the efficiency of management of air pollutant emission from in-service motor vehicles. At present, MOT has adopted the application of emission standard limits to in-service and imported second-hand automobiles in accordance with laws.

CONTROL OF AIR POLLUTANT EMISSIONS FROM IN-SERVICE MOPEDS AND MOTORCYCLES

It has witnessed rapid growth in the number of motorcycles and mopeds. Due to their specific use, motorcycles and mopeds have become one of the main sources of environmental pollution, especially in big cities. Consequently, the control of the circulation, as well as the emission from such kinds of vehicles, has become a serious concern of many big cities, namely Hà Nội and Hồ Chí Minh City.

To perform the tasks assigned by the Prime Minister in Decision No. 909/QD-TTg dated June 17th, 2010 approving the scheme of controlling exhaust emissions of in-service motorcycles and mopeds, in 2016, MOT elaborated and submitted to the Prime Minister the regulations on emission control for in-service motorcycles in big cities. On the other hand, the control of the exhaust emission from in-service motorcycles and mopeds need to be associated with the regulations on the inspection of exhaust emission for motorcycles and mopeds. This content has not been specified in the Law on Road Traffic 2008. As a result, on January 19th, 2017, the Prime Minister issued Document No. 566/VPCP-CN requesting MOT to continue researching regulations on the application of emission standard limits and regulations on emission inspection for motorcycles and mopeds in the development of the revised Law on Road Traffic. On the basis of the provisions of the Law, MOT builds a roadmap for emission inspection for motorcycles and mopeds and implement it nationwide.

Energy labeling for new manufactured, assembled and imported road motor vehicle

To comply with the regulations on economical and efficient use of energy, MOT has issued and implemented the regulations on energy labeling for new manufactured, assembled and imported passenger cars up to 9 seats, motorcycles, and mopeds. Accordingly such types of vehicles, before put on sale, must declare their fuel consumption according to three levels, including in urban cycle, in a rural cycle, and a combined cycle.

From January 1st, 2015, consumers based on the energy label that indicates the information on fuel consumption of the automobile can choose modern technology and fuel-saving automobiles. Consequently, the consumers probably save their money during their use of automobiles.

In particular, the checking and testing of fuel consumption and certification of energy labeling of automobiles are done in combination with the testing of emission that not to generate cost or administrative procedure for certifying the fuel consumption level for the automobile manufacturers and importers▪

Study on psbA-trnH DNA barcoding characteristics in some species of polyscias genus

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Polyscias is a flowering genus that belongs to the Araliaceae family, which is commonly used for medical purposes and widely distributed over the world for its economic value due to the rich contents of phytochemical. DNA barcode is a robust method to identify species and evaluate phylogenetic relationships. In this study, the psbA-trnH region was used to investigate the relationship of five species of Polyscias genus. The sequencing results showed that the psbA-trnH sequence has about 500 nucleotides as expected length. Raw data has been analyzed and these sequences were compared to six reference sequences from NCBI. The phylogenetic tree of Polyscias genus-based psbA-trnH sequences with Tetraplasandra hawaiensis as out-group species was conducted by bioinformatic tools. The combination between the genetic distance method and Maximum likelihood proposed high confidence results. All five studied samples: P. balfouriana (LT), P. serrata Balf (LR), P. fruticosa (LN), P. scutellaria (LD), P. filicifolia (LTO) were grouped into same clade, which had a close relationship with P. sp. Wen 10765 and P. austranliana with reliable bootstrap supported (BS: 72). The psba-trnH region has been suggests as a case study inDNA barcoding researches. Thus, it would be considered widely used in further classification studies.

INTRODUCTION

DNA barcoding is a modern biological tool for accurate, rapid, and automatable species identification and phylogenetic reconstruction using only a standardized piece of DNA sequence. Regions are selected to be barcode is required to universally present in target lineages and have adequate sequence variation to discriminate among species (Hebert et al., 2003).

The short DNA sequence from a standard region of the genome is known as a marker which is different for various species. For example, the most commonly used marker for an animal is Cytochrome C Oxidase 1 (COI), found in mtDNA. Another suitable marker for fungi is the Internal Transcribed Spacer (ITS) rDNA. Chloroplast DNA barcodes as matK, psbA-trnH, rbcL are used in plants (Kaur, 2015).

Polyscias is a genus of the Araliaceae family. This genus is widely distributed over the world for economic value and is commonly used for medical purposes due to its rich contents of phytochemical. Some Polyscias species are not only functional but also ornamental. Polyscias is named as two Greek words: "poly" means many and "skia" means shade, which indicates the thick foliage characteristic of this genus (Ashmawy et al., 2018). According to the investigation of Vietnamese Ginseng Center in Southern provinces, Polyscias has 6 species: Polyscias fruticosa (L) Harm, Polyscias balfouriana Bailey, Polyscias filicifoli (Merr et Fourn w) Bailey, Polyscias guilfeylei var lacinita Bailey, Polyscias guilfeylei (Cogn et Marche) Bail, Polyscias scutellarie (N.L.Burn) Fosberg (Nguyen Thượng Dong et al., 2007).

In the paper, we focused on studying on psbA-trnH DNA barcode to investigate the diversity of five species of Polyscias.

MATERIALS AND METHODS

Plant materials

Five leaf specimens of the Polyscias genus were collected at the Department of Agronomy, Vietnam National University of Agriculture (Table 1).

DNA extraction, amplification, purification and sequencing

Total DNA was extracted from fresh leaves follow the extraction procedure by CTAB (Doyle et al Doyle, 1990).

Table 1: Information about studied samples

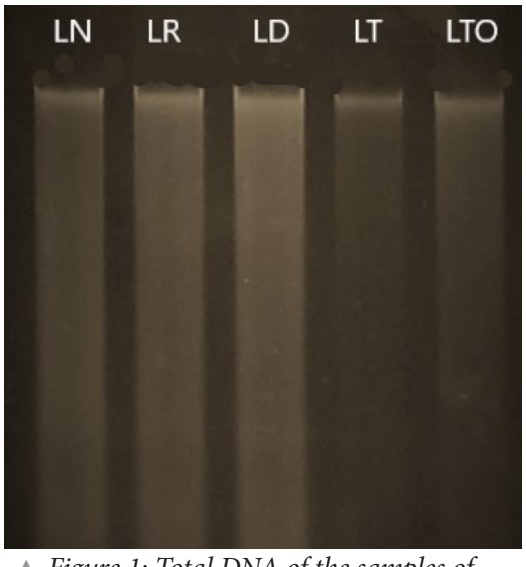
No.	Code	Scientific Name	Vietnamese name
1	LT	Polyscias balfouriana	Dinh lang la tron
2	LTO	Polyscias filicifolia	Dinh lang la to
3	LN	Polyscias fruticosa	Dinh lang la nho
4	LD	Polyscias scutellaria	Dinh lang la dia
5	LR	Polyscias serrata Balf	Dinh lang la rang

Table 2: List of the psbA-trnH primer used in the study

Primer	DNA region	Sequence (5' - 3')	Amplification size (kb)
Pu_psbA-trnHF	psbA-trnH	GTTATGCATGAACGTAATGCTC	0.5kb
Pu_psbA-trnHR		ATGGTGGATTCACAATCC	

Specific primers Pu_psbA-trnH were designed to amplify psbA-trnH genes of five Polyscias samples based on the reference sequences on Genbank (Table 2).

The condition of amplification was optimized for 25 µl of PCR, including 50 ng extracted DNA, 2.5 µM of each primer, 0.75 unit of Phusion polymerase (Thermo Scientific), 1 mM of each dNTP and Phusion PCR buffer. The amplification thermal cycles were performed as follows: A cycle of denaturing at 95°C for 4 minutes, 35 cycles of amplification including 95°C/30s followed by annealing at 58°C/30s (trnL-trnF and rbcL) and extension 72°C/1 min 30s; ending with a final extension step of 72°C/5 mins. The PCR products were checked by electrophoresis on 0.8% agarose gel. Successful PCR products were purified by Thermo Scientific GeneJET Gel Extraction Kit. psbA-trnH fragments were sequenced by the Sanger Sequence method. Sequencing was carried out using the BigDyeTM terminator v 3.1 cycle sequencing kit (Applied Biosystems) in a final volume of 20 µl. The sequencing was performed on an ABI 3500 genetic analyzer following Sanger's principle.



▲ *Figure 1: Total DNA of the samples of Polyscias genus*

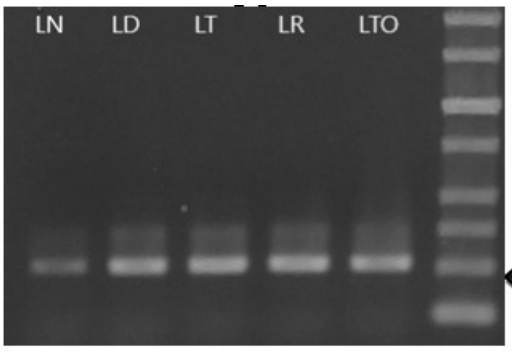
Note :
LN: Dinh lang la nho (P. fruticosa)
LD: Dinh lang la dia (P. scutellaria)
LT: Dinh lang la to (P. balfouriana)
LR: Dinh lang la rang (P. serrata Balf)
LTO: Dinh lang la to (P. filicifolia)

RESULTS AND DISCUSSION

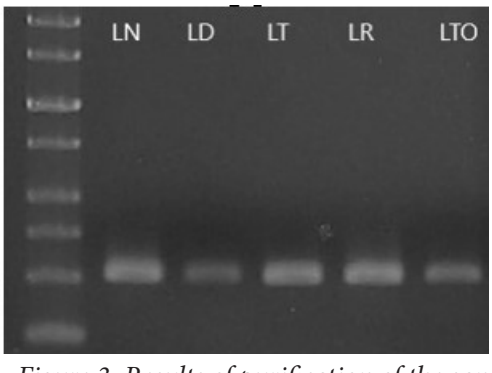
DNA extraction

In this study, the genomic DNA of five Polyscias leaf samples (LT, LTO, LN, LD, LR) were isolated using the CTAB extraction protocol. By using extraction buffer (as described above) combined with removing protein and impurities with a mixture of Chloroform: isoamyl alcohol (24:1) solution, precipitation with CH_3COONa 3M and EtOH 100%, RNase added, total DNA was collected. Figure 1 indicated that DNA bands were clear, not smeary; however, DNA genomic was still contaminated.

Then, optical density (OD) measurement was performed using Nanodrop Spectrophotometers to determine the concentration of DNA and retest the purity of total DNA. The results showed that samples had DNA concentration ranges from 108.549 to 757.212 ng/µl. the LN sample had the highest DNA concentration and the LT sample had the lowest DNA



▲ *Figure 2: Results of PCR reaction of the samples of Polyscias genus*



▲ *Figure 3: Results of purification of the samples of the Polyscias genus*

Note:
LN: Dinh lang la nho (P. fruticosa)
LD: Dinh lang la dia (P. scutellaria)
LT: Dinh lang la to (P. balfouriana)
LR: Dinh lang la rang (P. serrata Balf)
LTO: Dinh lang la to (P. filicifolia)

concentration (Table 3). However, all five DNA samples were enough concentration for the next steps. The LD, the LTO, the LT samples had values of A260/A280 in the ranges of 1.8-2.0, this means that contaminations were removed from genomic DNA. A260/280 of the LN sample was 1.705, this value demonstrates that the DNA sample was contaminated with a protein. DNA sample of the LN had OD value 2.018, DNA was contaminated with RNA. However, the concentration of DNA samples was enough, and these samples were quality enough to be used for the next steps in our study.

PCR amplification of psbA-trnH fragment

The total DNA of five Polyscias leaves was enough quality for PCR reaction. In this study, the psbA-trnH primer was used to multiply the genes of 5 samples of the Polyscias genus. The psbA-trnH is one of the most rapidly evolving spacers in chloroplast DNA and this region demonstrated good universality and high amplification success (Shaw et al., 2005; Yao et al., 2009). Primers Pu_psbA-trnH for amplification of target regions were designed with PCR expected length of about 0.5kb.

For DNA templates, the amount of DNA used for PCR needs to be adjusted accordingly. The PCR efficiency can be reduced if the concentration of DNA templates is too high. During the reaction, we adjusted the primer concentration, as well as the DNA concentration to find the optimal amounts. The annealing temperature was also tested at different temperature ranges and the optimal temperature was 58°C. The suitable thermal cycle is very important in PCR reaction because it ensures good torsion of the DNA molecules as well as exact priming and chain elongation. After optimization, we found the optimal thermal cycle for PCR reaction including 30 cycles.

When PCR reaction ended, PCR products were loaded in 0.8% agarose gel and compared to 1kb standard marker. Electrophoresis results showed that there were two bands but a DNA band of about 0.5kb was the most specific and bright in all five samples (Figure 2). Therefore, the pair of psbA-trnH primers multiplied psbA-trnH gene fragments as expected length. We could conclude that primers psbA-trnH were used to success amplification desired gene segments from the DNA of 5 plant samples belonging to the Polyscias genus.

Table 4: Reference sequences list

No.	GenBank Accession number	Reference species
1	JX106123.1	Polyscias australiana
2	JX106126.1	Polyscias sp. Wen 10765
3	JX106105.1	Polyscias macrocarpa
4	JX106124.1	Polyscias nodosa
5	JX106125.1	Polyscias schultzei
6	MH826635.1	Polyscias spectabilis
7	JX106143	Tetraplasandra hawaiensis

Next, PCR products were purified to prepare for DNA sequencing. We used the purification procedure of the Thermo Scientific GeneJET Gel Extraction Kit to collect specific DNA bands (0.5kb). This method ensured the purity of products (Figure 3). All DNA bands were bright and specific. Thus, the quality of DNA was well enough for sequencing.

DNA sequecing

The nucleotide sequences of the psbA-trnH fragment of five Polyscias samples were identified. Results showed that all five samples were well-sequenced and had the length of psbA-trnH gene about 500 nucleotides. Therefore, the psbA-trnH segments were amplified accurately.

The raw sequences were edited using Chromas to remove noise signals at the beginning and the end. Finally, each sequence had 457 nucleotides and GC contents were about 30%, a typical characteristic for noncoding regions of the chloroplast genome (Degjareva et al., 2012). These sequences were compared to available sequences collected from GenBank, NCBI (Table 4).

Comparisons were performed by ClustalW Multiple alignments of Bioedit software. This analysis involved 11 psbA-trnH sequences: five sequences from the samples, six reference sequences (Table 4). References were psbA-trnH sequences of species belonging to the Polyscias genus. These sequences were published on NCBI.

Table 3: OD values of five Polyscias samples

Sample Name	Nucleic Acid (ng/uL)	A260/A280	A260	A280
P. fruticosa (LN)	757.212	1.705	15.14	8.884
P. scutellaria (LD)	424.499	1.94	8.49	4.376
P. serrate Balf (LR)	295.159	2.018	5.903	2.925
P. filicifolia (LTO)	178.971	1.859	3.579	1.925
P. balfouriana (LT)	108.549	1.917	2.171	1.133
P. balfouriana (LT)	108.549	1.917	2.171	1.133

Species selected to be out-group which is species belonging to other genus or other family but they must have relative similarity with the references and studied sequences. In this study, we selected Tetraplasandra hawaiensis of Tetraplasandra genus (Araliaceae family) as out-group species.

Table 5a: The polymorphism sites of gene psbA-trnH of 11 Polyscias species

Species	Polymorphism sites													
	52	53	54	55	56	136	138	139	140	141	143	144	147	148
P. balfouriana (LT)	T	C	T	T	-	-	A	G	T	T	C	T	A	A
P. filicifolia (LTO)	T	-	T	T	G	-	A	G	T	T	C	T	A	A
P. fruticosa (LN)	T	T	T	G	-	-	A	G	T	T	C	T	A	A
P. scutellaria (LD)	-	-	T	T	G	-	A	G	T	T	C	T	A	A
P. serrata Balf (LR)	T	T	T	T	G	-	A	G	T	T	C	T	A	A
P. australiana	T	-	T	-	G	-	A	G	T	T	C	T	A	A
P. sp. Wen 10765	T	-	T	T	G	-	A	G	T	T	C	T	A	A
P. macrocarpa	T	-	-	-	G	C	T	A	C	C	A	G	T	C
P. nodosa	G	-	-	-	A	C	T	A	C	C	A	G	T	C
P. schultzei	T	-	-	-	G	C	T	A	C	C	A	G	T	C
P. spectabilis	G	-	-	A	A	C	T	A	C	C	A	G	T	C

Table 5b: The polymorphism sites of gene psbA-trnH of 11 Polyscias species (continued)

Species	Polymorphism sites													
	149	150	156	157	158	169	287	295	296	356	424	432	452	459
P. balfouriana (LT)	A	C	T	T	A	G	A	T	G	A	A	A	G	G
P. filicifolia (LTO)	A	C	T	T	A	G	A	T	G	A	A	A	T	A
P. fruticosa (LN)	A	C	T	T	A	G	G	T	G	A	G	A	G	A
P. scutellaria (LD)	A	C	T	T	A	G	G	T	G	A	G	A	T	A
P. serrata Balf (LR)	A	C	T	T	A	G	G	T	G	A	A	A	T	A
P. australiana	A	C	T	T	A	G	G	T	G	A	A	A	T	A
P. sp. Wen 10765	A	C	T	T	A	G	G	T	G	A	G	A	T	A
P. macrocarpa	T	T	A	A	G	C	G	G	A	G	G	G	T	A
P. nodosa	T	T	A	A	G	C	G	G	A	A	-	G	T	A
P. schultzei	T	T	A	A	G	C	T	G	A	G	G	G	T	A
P. spectabilis	T	T	A	A	G	C	G	T	A	G	G	G	T	T

In the Polyscias genus, the non-coding psbA-trnH intergenic spacer is located from nucleotides 19 to 429. This spacer is located between the psbA gene and the gene of histidine transfer RNA (trnH), which plays an important role in the regulation of the expression of these genes. Degtjareva et al. (2012) has been proposed psbA-trnH region as suitable for DNA barcoding studies.

The polymorphism sites of 11 sequences were observed in Table 5, the results showed that psbA-trnH regions of five studied sequences from our samples were the most similar to P. australiana, followed by P. sp. Wen 10765. Studied sequences had the greatest difference with P. nodosa.

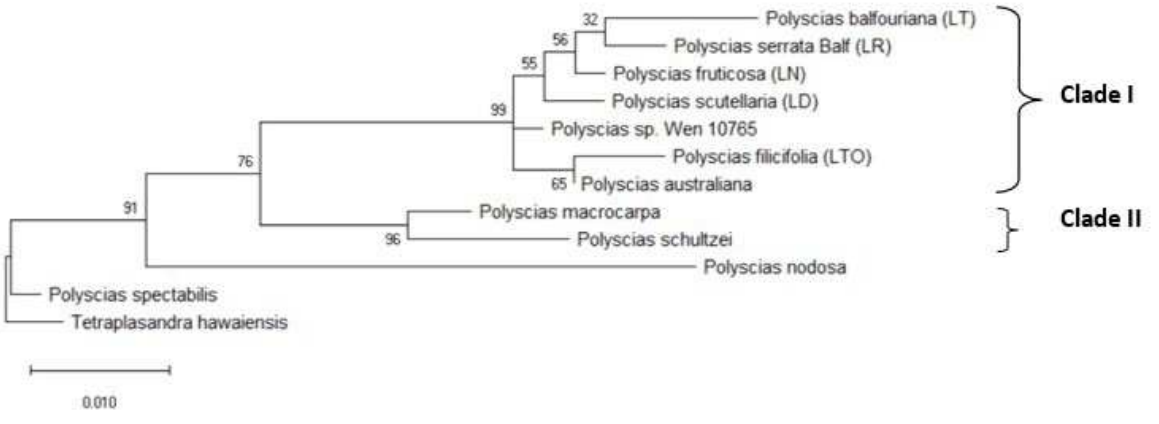
Genetic distance and phylogenetic tree

Genetic distances were calculated automatically by the pairwise distance method in MEGAX software. The pairwise distance method is an evaluation of the differences between pairs of sequences and then these differences transform into a distance. These distances were used to estimate a tree.

The results compared the differences between the pairs of sequences according to Kimura 2 model Parameter (Kimura, 1980) indicated that the ranges of genetic difference were from 0.00661 to 0.08506 in which the lowest genetic difference was 0.00661 of P. filicifolia (LTO) and P. australiana. Therefore, two species could have a close relationship. 0.00663 was the difference between P. australiana and P. sp. Wen 10765. The genetic difference was 0.00883 found in P. fruticosa (LN) and P. scutellaria (LD); P. fruticosa (LN) and P. serrate Balf (LR); P. fruticosa (LN) and P. sp. Wen 10765. Thus, P. fruticosa (LN)

Table 6: Genetic distances (pairwise method)

	1	2	3	4	5	6	7	8	9	10	11
1. *Polyscias balfouriana* (LT)											
2. *Polyscias filicifolia* (LTO)	0.01997										
3. *Polyscias fruticosa* (LN)	0.01553	0.01773									
4. *Polyscias scutellaria* (LD)	0.02004	0.01777	0.00883								
5. *Polyscias serrata* Balf (LR)	0.01552	0.01775	0.00883	0.01330							
6. *Polyscias australiana*	0.01779	0.00661	0.01107	0.01107	0.01107						
7. *Polyscias sp. Wen 10765*	0.02004	0.01328	0.00883	0.00884	0.01325	0.00663					
8. *Polyscias macrocarpa*	0.05147	0.04382	0.03631	0.03882	0.04378	0.03635	0.03382				
9. *Polyscias nodosa*	0.08506	0.07656	0.07101	0.07106	0.07672	0.06827	0.06823	0.06306			
10. *Polyscias schultzei*	0.05656	0.04885	0.04382	0.04636	0.05136	0.04387	0.04129	0.01647	0.06300		
11. *Polyscias spectabilis*	0.05793	0.05040	0.04544	0.04544	0.05050	0.04299	0.04062	0.03183	0.05243	0.03939	
12. *Tetraplasandra hawaiensis*	0.05049	0.04301	0.03810	0.03810	0.04309	0.03568	0.03329	0.03465	0.05563	0.04232	0.00692



▲ *Figure 5: Maximum Likelihood tree of Polyscias based psbA-trnH sequences*

Note: *Branch lengths are to scale. Major clades at psbA-trnH tree were indicated. Numbers on nodes are bootstrap support values.*

could be grouped into a group with P. scutellaria (LD), P. serrate Balf (LR) and P. sp. Wen 10765. The difference between P. nodosa and P. balfouriana (LT) was 0.08506 showed the highest difference.

A phylogenetic tree of 12 sequences was constructed using the Maximum-Likelihood (ML) methods based on the Hasegawa-Kishiho-Yano model in MEGAX. ML method is one of the most widely used for phylogenetic tree reconstruction. When 1000 bootstrap replicated of the data ran, bootstrap support values for singular clades had been computed. These values indicate how many times out of 100 the same branch was observed when repeating the phylogenetic reconstruction on a re-sampled set of data.

In this study, the tree diagram constructed with psbA-trnH data using the Maximum-Likelihood method indicated that there were two classifications. All five examined species: P. balfouriana (LT), P. serrata Balf (LR), P. fruticosa (LN), P. scutellaria (LD), P. filicifolia (LTO) were grouped in Clade I, which had a close relationship with P. sp. Wen 10765 and P. australiana with well supported (BS:76). Clade II included two reference species (P. macrocarpa and P. schultzei) with strongly supported (BS:96). P. nodasa and P. spectabilis had a quite distant relationship with studied species. In Clade I, P. balfouriana (LT) and P. serrata Balf (LR) were sister groups- two descends that split from the same node with weak supported (BS:32), P. filicifolia (LTO) and P. australiana were sister groups (BS=65) (Figure 5).

Thus, chloroplast intergenic psbA-trnH spacer has recently become a popular tool for plant identification and phylogenetic analyses. This region has been proposed as suitable for DNA barcoding studies. Since the psbA-trnH is one of the most rapidly evolving spacers in chloroplast DNA with 75 bp conserved fragments at the ends. Besides, it demonstrated good universality and high amplification success (Degtjareva et al., 2012). Therefore, psbA-trnH gene should be widely used for further plant phylogenetic analyses in the world in general and Việt Nam in particular.

CONCLUSIONS

The five psbA-trnH fragments from samples of five leaves of Polyscias genus were determined in the nucleotide sequence with the length of 457 nucleotides. By using Bioedit, BLAST, and MEGAX software, the sequences were analyzed and constructed phylogenetic trees of Polyscias species based on psbA-trnH fragment. From the research, five psbA-trnH sequences of the five species were grouped in Clade I and shown the relationship among the five Polyscias with six reference sequences. The DNA barcoding that we researched on the paper would contribute to the further phylogenetic of medicinal plants of Việt Nam and research on valuable plant gene conservation in Việt Nam.

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VIỆT NAM STRIVES TO BECOME REGIONAL PIONEER IN REDUCING OCEAN PLASTIC WASTE

Việt Nam is striving to become a regional pioneer in reducing ocean plastic waste, heard a recent virtual meeting of environmental officials of Việt Nam, Germany, Ecuador and Ghana.

At the event, they discussed the holding of a Ministerial Conference set for September to reach a global strategy to end marine litter and plastic pollution, with an aim to ensuring a future with clean seas.

Director General of the Vietnam Administration of Seas and Islands (VASI) under the Ministry of Natural Resources and Environment (MONRE) Tạ Đình Thi, underlined that the time is now for countries to come together to develop a cohesive global framework - with clear milestones, stakeholder roles and responsibilities and progress indicators - to tackle transboundary marine litter and plastic pollution issues. "South-East Asia is in a unique position with a significant role to play here, and a new global agreement will provide the essential boost to our regional and national actions against the global plastic crisis", he added.

Việt Nam has adopted a development strategy to promote the maritime economy in parallel with protecting maritime environment and ecosystems, specifying "Preventing, controlling and significantly mitigating marine environmental pollution; being a regional pioneer in reducing ocean plastic waste" amongst the country's objectives for 2030.

Executive Director of the United Nations Environment Programme (UNEP) Inger Andersen called for transformational action now to put the brakes on plastic pollution. She affirmed that the UNEP stands ready to support member states' discussions towards stronger global action on single-use plastics, while urging them and other stakeholders to start the work of eliminating single-use plastics where possible.

A global agreement is needed to build consensus on the threat of marine litter, in a bid to unlock funding and provide the framework and impetus for action and change at local, national, regional and international levels. More than 120 countries have some sort of legislation in place to regulate or ban the use of single-use plastics, heard the meeting. In Africa, 34 of 54 nations have instituted bans on single-use plastics, while the European Union has also introduced a single-use plastics ban as well as an export ban on unsorted plastic waste.

However, the flow of plastic into the ocean continues and is projected to nearly triple by 2040▪

MAI HƯƠNG

The Basel Convention project to tackle plastic pollution in mountainous and remote regions

The growth of plastics production since the mid - 20th Century has substantially outpaced any other manufactured material. Approximately 6.3 billion tons of plastic waste have been generated since 1950, of which 12 percent has been incinerated, less than 10 per cent recycled and nearly 80 percent either discarded or landfilled.

Plastic is everywhere, even in places where one would not expect to find it. Remote but important regions are increasingly impacted, from Mount Everest and other high-altitude and apparently pristine alpine nature reserves to small islands in the middle of our oceans, for example in the Indian Ocean. So, plastic pollution is a growing global concern. The public is increasingly moved by images of plastic waste in seas and on beaches worldwide, whilst simultaneously, scientific research aims at understanding the effect of particles known as "microplastics" on human health and the environment. Much of the on-going research is focused on effects of microplastics on the marine and freshwater environments and more studies are indicating the presence of microplastics in the atmosphere and revealing their impact on inland ecosystems. This is particularly worrying given the importance of land-based ecosystems and the services they deliver.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1989 and as of today has 188 Parties, giving it almost universal coverage. It is the only global legally binding agreement covering plastic waste. Recent decisions at the Basel Convention's Conference of the Parties (COP) have shown that the international community recognizes the need to tackle this problem at source. In May 2019, the ground-breaking decisions to amend the Annexes to the Convention was adopted. This was a first step to challenge the most pressing questions in the field of plastic waste, namely, how to prevent and minimize their generation, how to better control transboundary movements of plastic wastes, manage enormous quantities of plastic waste in an environmentally sound manner and prevent leakages into the environment, giving ever more attention to land-based sources of plastic waste. These Amendments become effective on 1st January 2021.

The Plastic Waste Amendments will change the way plastic waste is internationally traded, bringing additional types of plastic waste into the existing control mechanism known as the Prior Informed Consent (PIC) Procedure. Increased transparency, traceability and sharing of information will make enforcement more effective, curbing the illegal dumping of plastic waste in countries lacking the capabilities for environmentally sound management. This new regime will also provide a powerful incentive for the private sector, Governments and other stakeholders to strengthen capacities for recycling. Moreover, it will help create jobs and economic opportunities, not least by incentivizing innovation, such as in the design of alternatives to plastics and the phase-out of toxic additives.

The Basel Convention Plastic Waste Partnership was set up to help operationalize the Plastic Waste Amendments and to significantly reduce the discharge of plastic waste and microplastics into the environment. With more than 100 members from Governments, civil society and the private sector, the Partnership has four project groups through which pilot projects and other activities will be implemented.

The Secretariat of the Basel Convention is also proud to implement a project entitled "Plastic waste in remote and mountainous areas", with financial support from France and Norway. The project aims to build an improved understanding of the plastic waste situation in remote and mountainous areas, enhance knowledge of lessons learned and best practices in the environmentally sound management of plastic waste in such areas among relevant stakeholders and enhance their ability for informed decision-making through the availability of options and recommendations, increased awareness of the plastic waste challenge and the steps needed to address it. Subsequently, the project seeks to apply the collected best practices to mountainous and remote areas in a developing country setting through pilot testing of the outcomes. Some activities will also be implemented with a particular focus on the pilot country, Kyrgyzstan. including clean-up campaigns and the installation of collection containers for plastic waste▪

CHÂU LONG

▲ *Plastic waste not only flooded in seas, but also in remote and mountainous areas*

Asia Environmental Enforcement Awards 2020:

Recognize 8 winners on the frontline of protecting our planet

Exceptional efforts on the frontlines to stop environmental crime, including the illegal trade in wildlife and in plastic waste, have been recognized by the United Nations, INTERPOL and the World Customs Organization with the presentation of the 5th Asia Environmental Enforcement Awards (AEEAs). The Awards are given annually for achievement in combatting transboundary environmental crime.

Winners have worked across multiple countries, made dozens of arrests, and seized hundreds of endangered species and thousands of tons of illegal waste worth millions of dollars. Recipients have been nominated for their contributions across the categories of impact, gender leadership, innovation, integrity and collaboration.

"Transboundary environmental crime threatens both planet and people", said Ms. Dechen Tsering, UN Environment Programme (UNEP) Regional Director and Representative for Asia and the Pacific. "With COVID-19, the importance of preventing the illegal trade in wildlife and regulating plastic waste is becoming more and more apparent. Through the work of the UN and INTERPOL, we have improved the governance of transboundary environmental crime, but this means nothing without enforcement. That is why the work of this year's winners is vital. They are on the frontlines of environmental protection".

Environmental crime is the fourth largest illegal activity after drug smuggling, counterfeiting and human trafficking. The value of crimes such as illegal trade in wildlife and forest products, illegal waste dumping, smuggling of ozone-depleting substances, and illegal mining is estimated at up to US$ 258 billion per year.

REPRESENTATIVES OF ORGANIZATIONS AND INDIVIDUALS AWARDED THE 5TH AEEAS

The 2020 winners of the 5th AEEAs include:

1. Mr. Sudarshan Panthee and Mr. Birendra Singh Johari (Central Investigation Bureau, Nepal Police)

Inspector Panthee and Sub-Inspector Johari led a years-long investigation that resulted in the arrest of a notorious illegal wildlife trader, Kunjok Chiring Tamang, operating between China, India and Nepal on 25

June 2020. Tamang had been on the run since 2005, when he was convicted as the main trafficker after a seizure of 5 tiger skins, 36 leopard skins, 238 otter skins and 113 Kg of tiger bones near the Nepal-China border. The two officers showed exemplary commitment and perseverance in tracking Tamang through supply networks and financial analysis, uncovering hidden identities and further revealing crimes of money laundering.

2. Philippines Operation Group on Ivory and the Illegal Wildlife Trade (POGI)

POGI, a multi-agency Government task force, made a number of key arrests during the nomination period. Foremost amongst them was Sharon Jonion, a notorious online wildlife trader who had eluded authorities for 5 years. The team recovered 13 rare animals during this arrest. With representation from the Department of Environment and Natural Resources - Biodiversity Management Bureau (DENR-BMB) and the National Bureau of Investigation - Environmental Crime Division (NBI-ECD). the POGI team has provided an excellent example of collaboration and coordination between enforcement agencies leading to improved impact of operations against the illegal trade in wildlife.

3. Operasi Bersepadu Khazanah (Department of Wildlife and National Parks (DWNP) Peninsular Malaysia and Royal Malaysia Police Taskforce)

In 2019, Malaysia launched a special initiative to increase the protection of tigers - "Save Our Malaysian Tiger Campaign". Under this Campaign, Malaysia set up the Operasi Bersepadu Khazanah (OBK) taskforce to protect Malayan tigers from poachers and to increase patrols in protected areas of peninsular Malaysia. OBK has led to arrests of 87 wildlife criminals (49 foreign, 33 local), destruction of 460 wire snares and a total seizure valued at MYR 2.7 million (approximately US$ 670,000). OBK combined the forces of the Department of Wildlife and National Parks (DWNP) Peninsular Malaysia and the Royal Malaysia Police, who also worked closely with state agencies and non-governmental organizations. With the operation's success, the taskforce has expanded geographical operations into Sabah and Sarawak in West Malaysia to further protect wildlife from environmental crime.

4. Ms. Sasmita Lenka (Divisional Forest Officer, Athgarh Forest Division)

Ms. Sasmita Lenka manages a team of 92, who have managed to disrupt pangolin smuggling in the state of Odisha in Eastern India. Between August 2019 and April 2020, Ms. Sasmita Lenka's team detained some 28 persons and seized three live Indian pangolins, one dead pangolin and 5 kgs of pangolin scales. In one case in December 2019, she and her team busted an international pangolin smuggling racket by arresting 8 suspects. Her awareness drives have helped local communities provide information to authorities on potential trafficking operations. She has also filled roles often dominated by men with female staff, including as deputy rangers, foresters and forest guards.

▲ *Representatives of organizations and individuals were awarded the 5th AEEAs*

5. Mr. John Simon (District Customs Collector, Philippines Bureau of Customs)

Braving threats to his life, Mr. John Simon, a District Customs Collector of the Philippine Bureau of Customs, upended a multimillion dollar smuggling operation, seizing 10,000 tons of illegal waste being smuggled into the Philippines. After the seizure, Mr. John Simon pursued legal avenues to have the waste repatriated to the country of origin in accordance with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Collaborating with other agencies and advocacy groups, he helped to initiate court proceedings against three foreign suspects implicated in the smuggling operation and to propose new legislation on the illegal importation of waste. Simon also spearheaded the cleaning and restoration of an imported waste dumping site.

6. Wildlife Crime Control Bureau (India)

Recognizing the ever-growing presence of the online illegal wildlife trade, the Wildlife Crime Control Bureau initiated Operation WILDNET-II to deter potential traders and bring offenders to justice. WCCB created awareness-raising programs with stakeholders and other agencies and worked through social media and online trade portals such as Indiamart, Amazon and OLX, to share information on illegal wildlife trade activity. The operation resulted in the arrest of a dozen offenders and the initiation of 9 criminal cases. An array of wildlife species and commodities were also seized, including falcons, pangolins, rhino horn, coral, sea fans, antlers, civet cats, parakeets and turtles.

7. Enforcement Division, Department of Environment (Malaysia)

Working closely with its line Ministry of Energy, Science, Technology, Environment and Climate Change (Malaysia) and authorities from the United Kingdom, Malaysia's Department of Environment repatriated 42 containers of illegally shipped plastic waste in November 2019. The Government of Malaysia has aimed to address concerns that the country was one of the world's largest importers of plastic waste. As a result of the actions taken by the Enforcement Division within the Department of Environment, more than 200 containers of illegal plastic waste have been repatriated and multiple illegal plastic recycling facilities have been closed.

8. Mr. Adi Karya Tobing (Police Chief Commissioner of Indonesian National Police); Mr. Sugeng Irianto (Police Commissioner of Indonesian National Police); Mr. Rasio Ridho Sani (Director General for Law Enforcement, Ministry of Environment and Forestry of Indonesia)

Police Chief Commissioner Adi Karya Tobing, Police Commissioner Sugeng Irianto and Rasio Ridho Sani, Director General for Law Enforcement led an investigation that resulted in the conviction and dismantling of a large-scale wildlife crime network trafficking endangered species parts from Bali to the Netherlands. Tracking down a Dutch suspect living in Bali, Mr. Adi Karya Tobing, Mr. Sugeng Irianto Irianto, Mr. Rasio Ridho Sani and their teams were able to effect an arrest and seize many CITES-listed species. Authorities seized 53 Buru Babirusa skulls, more than 100 sawfish rostrums, huge amounts of coral and snakeskins, whale bone and more. This seizure was used in the court case as evidence, leading to prosecution and imprisonment of the convicted individual. Court proceedings have also been initiated against the suspect in the Netherlands. This was the first time that the Police, the Office of the Director General and Indonesian and Dutch authorities had cooperated on an environmental crime case of this scale▪

ĐỖ HOÀNG

ASOEN Vietnam: Cohesive and responsive for Việt Nam's 2020 ASEAN Chairmanship

NGUYỄN MINH CƯỜNG, NGUYỄN THANH NGA
ASOEN Vietnam Office, Vietnam Environment Administration

2020 - a turbulent year for the world in general and for Việt Nam due to the face of the Covid-19 pandemic. 2020 is also the first year that Việt Nam concurrently undertakes the Presidency of ASEAN and the Non-Permanent Member of the United Nations Security Council. Việt Nam has assumed the ASEAN Year 2020 with the theme of "Cohesive and responsive ASEAN" in the context of requiring new skills and creativity unprecedented by ASEAN and the world. Along with the active support of the ASEAN authorities, Vietnam's success as the Vietnam's 2020 ASEAN Chairmanship has contributed to creating a new impetus for after more than five decades of establishment and development, ASEAN continues to affirm the strength of solidarity, resilience and the ability to flexibly adapt to challenges in new contexts of each nation and the world.

▲ *Deputy Minister of Natural Resources and Environment Võ Tuấn Nhân (left) delivered his opening remarks at the ASOEN 31 Meeting*

ASEAN cooperation in the field of environment is increasingly concerned by ASEAN Member States (AMS). In 2020, as the difficult context of the COVID-19 pandemic, AMS together have implemented solutions to minimize the impacts of the pandemic on the other hand, continue to cooperate closely to address the region's priority environmental issues on climate change, coastal and marine environment, chemicals and waste, water resources management, environmental education, environmentally sustainable cities, nature conservation and biodiversity. In particular, the current emerging issues as climate change, marine debris and inter-sectoral issues are also great concern to AMS.

SOME OUTSTANDING RESULTS OF ASOEN VIETNAM IN 2020

Not out of the general trend of the region, in 2020, ASOEN Vietnam has also actively promoted the implementation of cooperation activities, actively contributing to the regional activities, contributing to the success of the ASEAN Chairmanship 2020. In the context of the COVID-19 pandemic globally in general and the ASEAN region in particular, Việt Nam presides over the organization of important Conferences in the field of environment via video conferencing, including: The 21st Meeting of the ASEAN Working Group on coastal and marine environment (AWGCME 21) from 10 to 11 November 2020; The 22nd Meeting of the ASEAN Biodiversity Center Governing Board and Related Meetings (GB ACB 22) from 17 to 18 November 2020; The 31st Meeting of the ASEAN Senior Officials on Environment and Related Meetings (ASOEN 31) from 24 to 27 November 2020.

The ASOEN 31 Meeting recorded decisions related to the ASEAN collaborative environment and reviewed the report on the implementation progress of the ASEAN Working Groups (AWG), including: Nature Conservation and Biodiversity (AWGNCB); Chemicals and Waste (AWGCW); Coastal and Marine Environment (AWGCME); Environmentally Sustainable Cities (AWGESC); Environmental Education (AWGEE); Water Resource Management (AWGWRM); Climate Change (AWGCC). The ASOEN 31 Meeting also approved the Draft of ASEAN Joint Declaration on the conservation of biodiversity at COP 15 of the Convention on Biological Diversity (CBD); acknowledging the ASEAN green initiative that was launched at the ASEAN Biological Diversity Meeting 2020, tentatively scheduled to be held in early 2021; drafting the ASEAN Action Plan to combat marine plastic waste; adopting the revised ASEAN Awards Mechanism for organizing the 5th ASEAN Environmental Sustainable Cities Awards by 2021 and the 4th ASEAN Cities Environment Certification...

At the ASOEN 31 and related Meetings, Vietnamese delegation actively contributed comments on important issues, demonstrated responsibility to the region, strengthened multilateral rela-

tions as well as with each country in ASEAN, ASEAN+3. At the same time, Việt Nam also petitioned others AMS to address urgent environmental issues, including water pollution, transboundary air, marine debris and climate change to ensure better social welfare and a safer living environment as well as preserve and sustainably manage the community's biodiversity for generations of ASEAN people for now and in the future. Việt Nam also called on AMS, in the context that countries in the region and the world are coping with the COVID-19 pandemic, to cooperate closely and gather resources to gradually reverse the epidemic. At the same time, continue to work side by side to solve environmental problems in the region. On this occasion, Vietnamese delegation also informed AMS and international partners of the achievements of the ASEAN Chairmanship 2020, especially in the field of environment, the National Assembly of Việt Nam has passed the Law on Environmental Protection on 17th November 2020.

In 2020, as the national focal point for ASEAN cooperation activities on environment, the Vietnam Environment Administration (VEA) also submitted to the Minister of Natural Resources and Environment for consideration and approval of the plan to consolidate the Vietnam AWGs to improve the efficiency of cooperation activities of ASOEN Vietnam (Decision No. 14/QD-BTNMT dated November 6th 2020 of MONRE); Continue to implement the Project to develop and implement a Plan to implement the goals of the ASEAN Socio - Cultural Community until 2025 (Decision No. 1233/QD-BTNMT dated May 23rd, 2017 of MONRE). ASOEN Vietnam Office has also completed the task of "Building a website on ASOEN Vietnam's activities" with the aim of introducing, sharing and enhancing communication on ASEAN cooperation in environmental field. In addition, ASOEN Vietnam has also actively participated in related joint activities of the ASEAN Socio-Cultural Community and events hosted by Việt Nam during the ASEAN Chairmanship 2020.

ASOEN VIETNAM'S DIRECTION OF OPERATION IN 2021

2021 is determined to continue to be a challenging and difficult year for ASEAN cooperation in general and ASEAN cooperation on the environment if the COVID-19 pandemic is not fully resolved. Therefore, ASOEN Vietnam needs to be proactive and actively involved in regional cooperation activities, with a special focus on tasks such as:

Firstly, focusing on promoting the effective implementation of activities within the framework of the 7 AWGs: Continue to participate in the activities of the AWGs on climate change according to the Working Group's Action Plan, at the same time proactively organize the implementation of activities that Việt Nam currently plays the role of the focal country; participate fully in ASOEN annual Conferences, especially ASOEN 32 Meeting, AMME 16 Meeting and other related Meetings; develop ASEAN cooperation documents expected to be submitted to high levels for approval in 2021, including: Draft ASEAN Joint Declaration on climate change at COP 26 UNFCCC; Draft ASEAN Joint Declaration on biodiversity conservation at COP 15 CBD; Draft ASEAN Joint Declaration on Chemicals and Waste at the Conference of the Parties to the Basel, Rotterdam and Stockholm Convention; formulating and giving comments on the ASEAN Status Report on climate change; 6th ASEAN Environmental Status Report; coordinate with AMS, the ASEAN Secretariat (ASEC) and partners in implementing cooperation projects with a Vietnamese national component and other cooperation projects within the framework of the Working Groups; promote cooperation, exchange and sharing of information, data and experiences in 7 areas of ASOEN cooperation; well performed the role of the country to host the 11th ASEAN Working Group Meeting on climate change; organize the 5th ASEAN City Environmentally Sustainable City Award in Việt Nam in 2021 and the 4th Certificate of Potential Environmentally Sustainable Cities.

Secondly, Việt Nam will actively and proactively participate in activities within the environmental cooperation framework of ASEAN+3, East Asia, partner countries and international organizations: Participate in activities within the framework of the ASEAN - China Environmental Cooperation Strategy (2021 - 2025); continue to work closely with Japan and others AMS to implement ASEAN - Japan cooperation activities and projects on environment, climate change and marine debris; maintain close cooperation with Repuplic of Korea and AMS to implement cooperation programs and projects on environment and climate change; coordinate with partner countries and international organizations to implement ASEAN cooperation activities on environment, especially Norway, Germany, EU, GIZ, PEMSEA.

Thirdly, reciprocal activities of ASOEN Vietnam 2021 will continue to be deployed more synchronously and effectively to support ASOEN Vietnam Working Groups: ASOEN Vietnam will continue to promote communication and propaganda about ASOEN Vietnam activities, in particular: Regularly posting information on the website about ASOEN Vietnam in order to propagate and advertise ASOEN Vietnam's activities; Considering, reviewing, proposing to promulgate a Regulation on the organization of ASEAN environmental Awards in Việt Nam, including: Awards for Environmentally Sustainable Cities; The ASEAN Ecological School Award; ASEAN Environmental Youth Award and related Awards; Organizing the Vietnamese working delegations to attend regional Conferences and Seminars; Support the implementation of priority reciprocal activities within the framework of ASOEN Vietnam Working Groups▪

GIZ Vietnam and the Ministry of Construction cooperate to reduce greenhouse gas in building

▲ *Representatives of the GIZ Vietnam and the HREM sign the MoU*

The German Development Cooperation - GIZ Vietnam and the Ministry of Construction's Housing and Real Estate Market Management Bureau (HREM) have signed a Memorandum of Understanding (MoU) for cooperation on the joint development of the Vietnam Green Housing Program (VGHP) under the implementation of the Program for Energy Efficiency in Buildings (PEEB) in Việt Nam.

The MoU focuses on enabling greenhouse gas (GHG) emissions mitigation. GIZ said the VGHP, which is supported through the GIZ Program for Energy Efficiency in Buildings (PEEB) in Việt Nam, aims to benefit the mid-income housing market by targeting the low-cost commercial housing segment.

Under the partnership, GIZ and HREM will develop and implement the VGHP. A particular focus of the Program is improving energy efficiency and reducing GHG emissions in the affordable housing market as per Vietnam's commitment in its Nationally Determined Contribution to the Paris Agreement on climate change.

Through the VGHP, the partnership aims to motivate private housing developers to move into the market for energy-efficient and green buildings and stimulate local commercial banks to develop green financing products for both housing developers and homebuyers, as well as green equipment and material suppliers in the low-cost commercial housing segment.

In Việt Nam, the total production value of the construction sector reached 358.6 trillion VND (15.6 billion USD), contributing 5.94 percent of the national Gross Domestic Product (GDP) in 2019.

"As the potential for GHG emissions reduction through energy efficiency in the construction sector is enormous, this cooperative endeavor will contribute to Vietnam's aim of reducing GHG emissions", said Mr. Kia Fariborz, Chief Technical Advisor of the 'Support Program for the implementation of the Paris Agreement (SIPA).

Deputy Director General of HREM Hà Quang Hưng highly appreciated the initiative for integrating PEEB's goal of energy efficiency and low emissions with the Government's goal of low-cost commercial housing development.

According to calculations, within 10 years after reaching the target, apartment buildings will save about 6.3 billion kWh (kilowatts per hour) of electricity, equivalent to 15.8 trillion VND (687 million USD). This is a significant cost saving that will benefit the homebuyers if they use energy efficiently in the apartment. In addition, in the short term, the Program will create a plentiful supply of low-cost commercial housing, thereby facilitating the people's access to affordable housing.

The PEEB is a joint initiative between Germany and France that combines consulting, financial resources and technical expertise from GIZ, French Development Agency (AFD) and Agency for Ecological Transition (ADEME) to help partner countries increase energy efficiency in buildings. The PEEB aims to minimize energy demand in buildings at reasonable incremental costs, promote green investment in energy efficient buildings and facilitate access to green financing from international and local financial institutions. In Việt Nam, the PEEB focuses on green housing programs and large-scale commercial buildings▪

MAI HƯƠNG

European Commission and UNEP increasecooperation on tackling the climate, biodiversity and pollution crises

A stronger focus on the promotion of circular economy, the protection of biodiversity and the fight against pollution lie at the heart of a new agreement signed on 26th February 2021 for enhanced cooperation between the European Commission (EC) and the UN Environment Program (UNEP). Both partners are also paying increasing attention to nature protection and restoration as one of the solutions to tackle such advancing crises.

▲ *EC and UNEP also pay increasing attention to nature protection*

In a virtual session, European Commissioner for the Environment, Oceans and Fisheries Virginijus Sinkevičius and UNEP Executive Director Inger Andersen signed a new Annex to the 2014 Memorandum of Understanding between the EC and UNEP, outlining revised areas of cooperation for the period 2021 - 2025.

"We welcome the opportunity to step up engagement with the UNEP on the climate, biodiversity and pollution crises, helping us to build a healthier and more resilient society in a post-pandemic world. This is a new phase of cooperation that will help us to implement the European Green Deal and achieve the Sustainable Development Goals, but also to form a strong alliance ahead of crucial summits for the future of mankind, which are to take place later in the year", said Mr. Virginijus Sinkevičius.

He said: "UNEP looks forward to collaborating further with the EU and its member states, as well as within the UN system, to achieve the green and digital transition on a global scale across all segments of society. Keeping our sights on the Sustainable Development Goals, we will support Member States as we strive together for an inclusive and sustainable recovery from the pandemic".

The signing of this document is timely, taking place against the backdrop of the 5th UN Environment Assembly (UNEA5) and the launch of the Global Alliance on Circular Economy and Resources Efficiency (GACERE) as the global community seeks to respond to the COVID-19 pandemic and the pressing climate, resource and biodiversity emergencies. The partners look to reinforce existing synergies and to introduce fresh areas of action considering developments in the global environmental agenda, including the European Green Deal.

The partners underscore the need to mobilize all areas of society to achieve a green-digital transition towards a sustainable future. Cooperation between the EC and UNEP to date covers a wide range of activities, programs and projects in areas of common concern such as biodiversity, sustainable consumption and production, including circular economy and resource efficiency, climate change, water resources, sound chemicals and waste management, environmental monitoring and assessment, strengthening environment governance at the global, regional and national levels.

The five chapters identify how to: Improve the science-policy interface and international environmental governance; Enhance climate resilience and climate neutrality with a focus on sustainable energy; Promote healthy and productive ecosystems; Scale up the circular economy and resource efficiency; Work towards a pollution-free planet and better health.

The Annex builds on and looks to extend, existing close collaboration to address the environmental challenges and advance the sustainability agenda through the EC-UNEP strategic Framework Agreements and programmatic cooperation▪

NAM VIỆT

5 opportunities associated with the shift to a circular economy

The Platform for Accelerating the circular economy (CE) has presented businesses, organizations and Governments with the opportunity to create a more sustainable world. The CE Action Agenda (CEAA) identifies 5 opportunities associated with a more to a more CE.

From protecting human health to better jobs, the CE offers benefits beyond just the environment. More than 100 billion tons of resources enter the economy every year - everything from metals, minerals and fossil fuels to organic materials from plants and animals. Just 8.6% gets recycled and used again. Use of resources has tripled since 1970 and could double again by 2050 if business continues as usual. We would need 1.5 earths to sustainably support our current resource use. This rampant consumption has devastating effects for humans, wildlife and the planet. It is more urgent than ever to shift from linear, use-it-up-and-throw-it-away models to a CE: Where waste and pollution are designed out, products and materials are kept in use for longer and natural systems can regenerate.

5 OPPORTUNITIES

A CE is not just about fixing environmental wrongs, though: Evidence shows it can bring big opportunities and positive impacts across industries, sectors and lives. A growing number of businesses, governments and civil society organizations are coming together to drive the change through the Platform for Accelerating the CE (PACE). More than 200 experts from 100 organizations helped develop the CEAA, a set of publications that analyze the potential impact and call for action across five key sectors: Plastics, textiles, electronics, food and capital equipment (machinery and large tools such as medical scanners, agricultural equipment and manufacturing infrastructure). The Action Agenda demonstrates five opportunities associated with the shift to a CE:

1. Make better use of finite resources

The CE concept is all about making better use of natural resources like forests, soil, water, air, metals and minerals. Take the textiles industry. Each year, huge quantities of fossil fuels are used to produce clothes from synthetic fibers each year. Textile production (including cotton farming) uses almost 100 billion cubic meters of water per year, approximately 4% of global freshwater withdrawal. At the same time, people throw away still-wearable clothes worth an estimated US$ 460 billion each year.

Creating a CE for textiles means shifting to recycled and recyclable materials in order to reduce the amount of land, water and fossil fuels used to produce new clothes. It means changing consumption patterns to reduce new purchases and keep clothes in use for longer, for instance by developing the second-hand and rental markets as well as changing the culture of fast fashion.

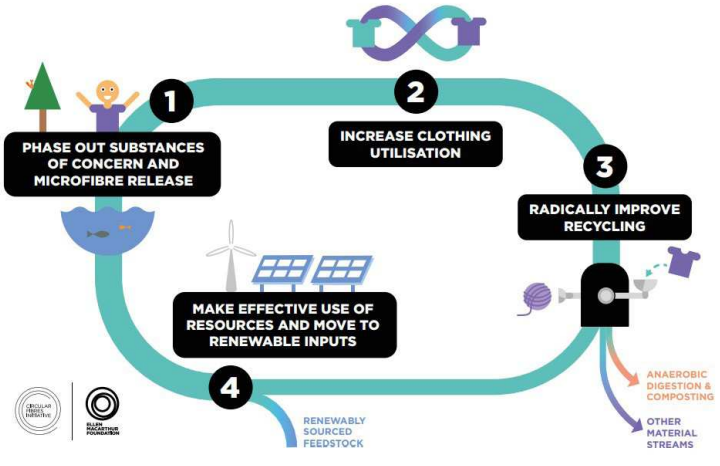
Research suggests that the purchase of 100 second-hand garments can displace the production of 85 new garments. And finally, it means ensuring that clothes at the end of their life are collected and recycled or repurposed into new clothes, further reducing resource use.

2. Reduce emissions

About 45% of global greenhouse gas (GHG) emissions come from product use and manufacturing, as well as food production. CE strategies that reduce our use of resources can cut global GHG emissions by 39% (22.8 billion tons) and play a crucial role in averting the dangerous impacts of climate change. For example, shifting towards recycled materials would alleviate the need to produce virgin plastics and synthetic fibers, which would significantly reduce fossil fuel use and associated emissions. Changing consumption patterns is also crucial: For example, if the average number of times a garment is worn were doubled, GHG emissions from the textiles industry would be 44% lower.

Creating a CE for food by reducing loss and waste is particularly crucial to lowering emissions: If food loss and waste were a country, it would be the third-largest emitter after the United States and China.

FIGURE 5: AMBITIONS FOR A NEW TEXTILES ECONOMY



▲ *What a new textiles economy could look like ?*

3. Protect human health and biodiversity

Every year, more than 9 million deaths occur due to air, water and soil pollution. This pollution also threatens biodiversity. Working towards a CE helps protect human health and biodiversity in many ways, including by making better use of natural resources (protecting water and land) and by mitigating the climate crisis. One of the clearest and most direct impacts of the shift to a CE will come from how we deal with products at the end of their life.

The world produces around 300 million tons of plastic waste every year, nearly equivalent to the weight of the entire human population. This is on top of 54 million tons of electronic waste (e-waste), of which just 17.4% gets collected and recycled. This waste becomes hazardous for human health and for biodiversity when it is mismanaged, either leaking into the natural environment or disposed of through open burning, landfills or substandard recycling.

Designing products to be kept in use for longer reduces the amount of waste produced. Creating proper collection and processing systems protects workers and the environment from hazardous materials. For instance, utilizing existing solutions like replacing plastic other materials, designing plastics so that they can be more easily recycled, and scaling up collection and recycling could reduce the flow of plastic waste into the ocean by 80% in 20 years - a shift that would be enormously beneficial for human health and biodiversity.

4. Boost economies

Research shows that the CE offers a US$ 4.5 trillion economic opportunity by reducing waste, stimulating innovation and creating employment. New business models focused on reuse, repair, remanufacturing and sharing models offer significant innovation opportunities.

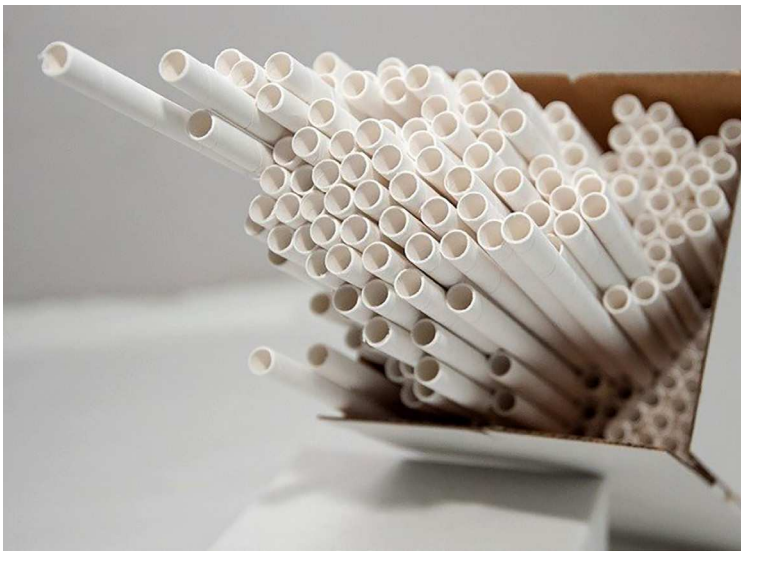
For example, a CE for plastics offers considerable economic benefits. Less plastic waste in the ocean would benefit industries like fishing and tourism, as plastic pollution currently leads to US$13 billion in costs and economic losses per year. Reducing the pollution and toxic emissions that come from the open burning of plastic waste would lower healthcare costs, while reducing fossil fuel use for plastic production would help mitigate climate change and its associated costs.

Many of these economic benefits and opportunities are long-term, indirect and require significant investment; a long-term view is key, as are short-term incentives to drive the change. This can include policies that create more immediate financial incentives for businesses to develop innovative new business models and enable the efficient flow of reused and recycled materials across global value chains.

5. Create more and better jobs

Transitioning to a CE could create a net increase of 6 million jobs by 2030. Making the most of this opportunity will require a clear focus on social and environmental justice. Jobs may be lost in more linear businesses; however new jobs will be created in fields such as recycling, services like repair and rental, or in new enterprises that spring up to make innovative use of secondary materials. These new jobs cannot be considered direct replacements, as they may be in different locations and require different skills. For instance, we must consider the millions of garment workers - mostly women - whose employment depends on the continuation of the fast fashion industry. Investing in a just transition via social dialogue, social protection and reskilling programs is key.

While a net increase in jobs is important, another value-add of circularity is the opportunity to provide formal work and improved working conditions for informal laborers. Around 15 million people worldwide work as "waste pickers" salvaging reusable or recyclable materials from garbage. Bringing these informal waste pickers into formal work in collection or recycling is a major opportunity to offer safer, more secure employment.



▲ *Replacing plastic straws with paper straws not only reducing the use of plastics but also minimizing carbon footprint*

MAXIMIZING THE IMPACT OF THE CE

Of course, there are always trade-offs to be considered and managed when working towards large-scale, systemic change. For example, shifting to bio-based plastics and natural, recyclable textiles like cotton will use less fossil fuels than traditional plastics or synthetic fibers, but may increase demands for land and water to grow such materials. Shifting to natural materials is a crucial part of the solution, but only if those materials are produced in a sustainable way - and only if consumption habits change, too.

It's also important to recognize the interconnected nature of the global economy. Many of the minerals and metals used in electronics are byproducts from the mining of aluminum, copper, lead and zinc, which are used across industries. Going circular in the electronics industry alone would therefore not do much to reduce dependence on these resources. Multiple industries must shift to create systemic change.

Finally, it will be crucial to keep social well-being and equity top-of-mind. For example, moving to a CE can shift investment and employment away from production and manufacturing (which tends to happen in lower-income countries) and towards later stages of the value chain, such as repair, resale, sorting and recycling (which are often concentrated in wealthier countries). We will need to ensure that economic benefits are equitably distributed to maximize the opportunity of a circular economy.

The above five impact areas exhibit some of the social, environmental, and economic benefits of a circular economy, but realizing these benefits will require ambitious action. Governments, businesses, civil society, finance institutions, research organizations - everyone has a role to play. The new CEAA is a good place to start▪

HOÀNG DƯƠNG

Việt Nam cracks down on poaching of migratory birds

The Biodiversity Conservation Agency (BCA) under the Vitetnam Environment Administration (VEA) is completing a draft directive on strengthening the management of migratory birds in Việt Nam for submission to the Prime Minister for approval.

Deputy Head of the BCA Hoàng Thị Thanh Nhàn said the hunting and consumption of migratory birds has become serious in several parts of the country over recent years, damaging biodiversity and the environment, presenting a risk from epidemics and affecting the delivery on international commitments in the East Asian-Australasian Flyway Partnership, to which Việt Nam is a member.

▲ *Cát Bà Island has been clear of birds due to the illegal migratory bird trappin*

The BCA recently held a technical meeting with bird preservation experts and representatives from the WWF and VietNature to discuss how to protect wild birds, especially migratory birds.

The Ministry of Agriculture and Rural Development and Ministry of Natural Resources and Environment have instructed relevant agencies to work with the People's Committee of Hải Phòng City on the matter.

The Prime Minister has also required Hải Phòng to crack down on wildlife poaching, especially at the Cát Bà World Biosphere Reserve. Hải Phòng authorities have urged relevant departments, agencies, and units to determine the responsibility of individuals and collectives regarding the issue.

Vice Director of Education for Nature Vietnam Bùi Thị Hà said that, to curb and prevent illegal hunting, a combination of measures is needed, including better communications, increased public understanding, and an improved legal framework and better law enforcement. "Asking people not to hunt wild birds and remove trapping nets is not enough. Strict punishment of violators is needed. People must be shown the legal penalties they face if they are involved in illegal wild bird hunting and trading", she said▪

BÙI HẰNG

Smart new technologies play a vital role in addressing plastic pollution crisis

From source to sea, our waters are contaminated by a plastics scourge. Approximately 8 million metric tons of plastic litter flow to the ocean annually, and only 9% of plastic waste ever produced has been recycled. A large percentage of the rest ends up in landfills, dumps and the environment, often findings its way to rivers, lakes and oceans through runoff, leakage, flushing of disposable wipes and hygiene products.

▲ *Approximately 8 million metric tons of plastic litter flow to the ocean annually*

Another major issue relates to microplastics-those plastics that are smaller than 5 millimeters and that pose increasing environmental, economic and health hazards. Sometimes these are intentionally added to products, for example in cosmetics, for seed coatings, paint, washing powders and other applications. They are also generated from wear and tear, through the production of synthetic textiles and tyre usage. In addition, discarded plastics break down into these smaller particles through natural weathering processes. Microplastics can enter water bodies through different pathways, including atmospheric deposition, run-off from land, roads and through municipal wastewater.

Much effort has been made to both identify the scale of the threat of plastics to the health of humans and ecosystems, along with solutions to tackle it. Water pollution by plastics and microplastics: a review of technical solutions from source to sea explores a set of innovative tech solutions for use in various scenarios.

A new study by the UN Environment Program (UNEP) and the International Water Management Institute (IWMI) offers a number of technological solutions aimed at tackling one of the world's most pressing issues. Among these potential technologies include: Introducing debris-cleanup boats, debris sweepers and sea-bins to remove plastics and other wastes carried into water bodies; Protecting large bodies of water by introducing wetlands along coastlines; Secondary and tertiary wastewater treatment which relies on membrane filtration to prevent microplastics entering rivers and lakes; Advanced coagulation technology to make water contaminated with microplastics drinkable; Promoting sustainable waste management practices to reduce plastic leakage.

A key principle of this work is preventing untreated wastewater, which is often packed with plastics and microplastics, from entering the environment in the first place. The study details financially sustainable waste recycling that is socially and legally acceptable and environmentally friendly. The study, composed of a toolkit and catalogue, analyzes the most relevant technologies to improve current waste and wastewater management practices and presents both the pros and cons of applying specific solutions to mitigate levels of plastic pollution from source to sea.

Dr. Mark Smith, Director General of IWMI said: "Waste management in most cities of developing countries is an expensive, labor-intensive and low-margin business, which explains why a large share of the generated waste is inadequately managed. The wastewater coming from urban residential, industrial and commercial settings is full of contaminants including plastics, microplastics and other debris. It is very important to reduce and remove plastic before it enters into wastewater treatment plants or freshwater bodies".

"To effectively tackle the crisis of plastic pollution in our freshwater and marine ecosystems, we need innovative technologies that will serve us for years to come. We need to look at how we address waste production, waste management as well as the treatment of wastewater and run-off holistically, at source and across sectors - a key part of building healthier, more sustainable societies. The technologies highlighted in this study should be supported by legislation, finance and awareness to lead to real change on the ground", said Executive Director of UNEP Inger Andersen.

Decision makers, experts and relevant stakeholders need to come together in order and to agree on the desired water quality in their local context and a sustainable combination of solutions▪

PHƯƠNG TÂM

Need to establish of Ramsar site network in Việt Nam

▲ *Tràm Chim National Park (Đồng Tháp Province)*

The Ministry of Natural Resources and Environment (MONRE) has proposed the establishment of a network of Ramsar sites and wetland reserves around Việt Nam.

A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention, an inter-governmental environmental treaty established in 1971 by UNESCO that came into force in 1975.

According to the Vietnam Environment Administration (VEA), Việt Nam has nine recognized Ramsar sites and has set up many wetlands with high biodiversity value. The country joined the Ramsar Convention in 1989, becoming the second of 50 countries around the world and the first in Southeast Asia to do so. It has promoted the nomination of Ramsar sites and successfully implemented a number of activities on the conservation and sustainable use of wetlands.

However, the management of Ramsar sites in the country still faces difficulties and the Ramsar Convention's objectives and strategic plans on conservation and the sound use of wetlands have not been fully and promptly implemented, resulting in the threat of biodiversity reduction at these sites. The reason for such limitations is that Ramsar sites tend to be located in natural reserves belonging to the special-use forest system, so have not been managed in line with regulations generally applied for wetlands. For example, the Tràm Chim National Park in Đồng Tháp Province is managed in line with regulations for special-use forests, so that forest fires can be controlled by preserving water. This, though, has undermined the biodiversity of the site. There are still no links or sharing of information and experience on the management, conservation, and sound use of wetlands between management boards of Vietnam's Ramsar sites and international partners.

Deputy Minister of Natural Resources and Environment Võ Tuấn Nhân said the establishment of a network of Ramsar sites and wetland reserves in Việt Nam will also help their management boards promote links and the sharing of information and experience and improve management efficiency. The network is expected to bring together scientists, managers, communities and stakeholders in promoting the conservation and sound use of wetland resources in Việt Nam, in particular improving management efficiency over Ramsar sites and mobilizing stakeholders to participate in the management, conservation and sustainable use of wetland resources▪

MAI HƯƠNG

Building quality economies in biosphere reserves

The livelihoods of local communities living in and around most protected areas in Việt Nam are often based on small-scale agricultural production activities. Deriving a sustainable income from such local produce is often difficult due to competition, unpredictable harvest yields and market price fluctuations. Balancing sustainable economic development with biodiversity conservation in such areas is a complex task, yet it is the main priority of UNESCO's Biosphere Reserves (BRs). An innovative approach to achieving this balance is the development of "quality economies". These economies are based on the development of local product brands that are environmentally friendly and reflect local characteristics and cultural traditions.

EXPERIENCING A QUALITY ECONOMY

In Europe, many recent rural development studies and initiatives have focused on a concept referred to as the "experience economy". In a rural development context this means the cultural or rural experience that can be added to local products. The benefits of adding "experience" to the local economy are that it combines a tourist experience with the purchase, or even the production, of a local product (or service).

The term "quality economy" differs slightly as it focuses more on the quality of the product. For example, this could mean the product's organic features and flavor, or its social, economic or ecological benefits to its locality, whereby the perceived value of the product adds to its sale price.

QUALITY ECONOMIES IN BRs

The Man and the Biosphere Program originated 40 years ago to stress the importance of humans and nature coexisting to ensure a sustainable future. BRs act as living sites for sustainable development where best practices can be tested and demonstrated by policy makers, researchers and local people.

Adding quality to agricultural products and services within BRs is an important component of this sustainability process. Quality economies can benefit local communities and support biodiversity conservation efforts within and around protected areas by sustaining local livelihoods that can become stable and independent of illegal sources of income such as poaching and deforestation.

▲ *Cúc Phương National Park (Ninh Bình Province)*

ACTIVITIES IN VIỆT NAM

A recent assessment by UNESCO of Vietnam's eight BRs found that there are many local products with great potential for 'quality' branding. Products such as natural honey from mangrove flowers, mushrooms, cashews, tea and citrus varieties to name a few, are considered to be of a high quality that is not yet reflected in the market price. These products have great potential to be value-added and sold at a higher price with effective labeling and promotion, especially to high-end consumers as Việt Nam climbs towards becoming a middle-income country.

In Cát Bà Archipelago BR, a new initiative was recently introduced where quality products and services received official certification and thereby the right to carry the official Cát Bà BR logo. The initiative was developed through cooperation between the Cát Bà Management Board, the Cát Hải District Department of Culture, Sports and Tourism, as well as local businesses and the community. The aim was to build a cache of premium green products and services that promote the BR and its aims of achieving sustainable development. At the first awards ceremony last year seven products were certified including bottled forest honey, electric vehicles for transport around the main township and a number of hotels and tourist services with minimum environmental impacts.

POSSIBILITIES FOR EXPANSION

The quality of rural products and their links with the tourism industry, as the world's largest and fastest growing industry, need to be seriously considered in efforts to make BRs living sites for sustainable development. In BRs there are enormous opportunities for lasting beneficial partnerships between farmers, local authorities, business and tourism companies through establishing "quality economies"▪

NHÂM HIỀN

Kiên Giang Biosphere Reserve

Kiên Giang, a province in Mekong River Delta located in the South East of Việt Nam, has an area of 6.348,5 km^2 and more than 200 km shoreline and over 56 km border line sharing with Cambodia. Like a small-scaled Vietnam, Kiên Giang is blessed with a system of river, mountain, delta and sea with hundreds of islands of different sizes. In 2006, Kiên Giang was recognised as the world's biosphere reserve with a total area of 1.146.078.7 ha including the sea, land and island. This biosphere has 3 core zones which are U Minh Thượng National Park (NP), Phủ Quốc NP and Phú Quốc Marine Protected Area, Hòn Chồng Nature Reserve and West coastal mangrove belt.

In Kiên Giang, most tropical ecosystems such as marine ecosystem, coastal ecosystem, mangroves, islands, coral reef, swamps, seasonal melaleuca wetland, primary tropical forest and secondary tropical forest on Phú Quốc Island, the only forest existing on limestone mountain in the South are all available. Kiên Giang is also home to dugong population which has a close relationship with the dugong population in Cambodian sea. These dugongs live on the seagrass line along the two countries' coast. Besides, this area is also the habitat for rare species of turtle in the world such as chenolia mydas, eretmochelys imbricata, lepictochelys elivacca and dermochelys coriacea. Coastal mangrove forests are like green walls that help to minimise possible climate change effects, rising sea levels and tsunamis. Kiên Lương Limestone range of mountain is regarded to have high biodiversity. Scientists have found species of endemic plants and animals to suplement the world's list. Of these, two species of birds being grus antigone and pelargopsis capensis now in danger have been found here.

Until now, the overall planning with an aim to develop tourism activities has been approved by the Government. The goal is to turn Phú Quốc Island into a high quality ecotourism zone of Việt Nam and the region and develop key tourism zones such as Kiên Lương, Kiên Hải and U Minh Thượng. Neighbouring zones such as Hòn Đất, Kiên Hải and U Minh Thượng are also highlighted. At the same time, geographical location of Kiên Giang is also favourable for open door economic development on account of the availability of ports, airports and relatively short distance from ASEAN countries. Kiên Giang also shares border with Cambodia, Thailand; therefore it is possible to exploit potential ecotourism value.

PHÚ QUỐC ISLAND

Kiên Giang has more than 140 islands of various sizes, of which Phú Quốc Island with an area of 589,19 km2 is the largest of Việt Nam. Rich biodiversity with its typical ecosystems such as forest ecosystem with broad-leaved trees and tropical rain; mangrove ecosystem, acid forests (rừng úng phèn), coral reef ecosystem, seagrass bed.

Given its significant potential for tourism development, Phủ Quốc is one of key zones which have been selected by the Government for investment and development planning. It is expected that Phú Quốc will soon be a high quality ecotourism zone which can compete well in the region and the world with its distinct characteristics and styles.

Phú Quốc - commonly called Pearl Island of the Easten Sea, boasts various unique beauty spots, rivers and springs, especially beaches lying along the coast, namely Sao, Trường, Đất Đỏ, Thơm, Gành Dầu, Dài, Cửa Cạn, Vòng, Khem. These

beaches have shallow sand, and plants growing close to the water thus creating an appealing ecotourism landscape. Beside, there are other types of tourism such as resort, sport, exploring forests, sea and caves, cultural tourism, recreational activities on beach, in the sea or along the coast.

Phú Quốc in particular has evergreen rainforests with different kinds of primary rain forests, suitable for study tours and it is possible to satisfy tourists of all kinds. Some products such as pepper, sim wine, dried sea food, lacquer paintings, pearl and in particular two kinds of being Spratelloides gracilis and Stolephorus indicus being main ingredients for well known Phú Quốc fish sauce are well received.

U MINH THƯỢNG NP

For tourists who love the country river waters and fruit gardens, it is worth paying a visit to U Minh Thượng NP, being one in three core zones of Kiên Giang Biosphere Reserve (BR). U Minh Thượng, once one of revolutionary bases, contains typical submerged melaluca forest growing on peat swamp. Tourists can also enjoy local specialties such as honey, dried fish such as ca sac, fish sauce "mam ca luoi trau"… There are various activities for tourists to choose from as well: kayaking, fishing, picking up vegetable in the forest, eating ancient food which all help tourists to gain an understanding of the past of the country. Besides, there are other forms of tourists which seek to combine studying the lifestyle of the people living in Cà Mau Peninsula and researching relics of Óc Eo - Phù Nam such as Cạnh Đền, Nện Chùa, Kè Một. U Minh Thượng is therefore considered as a living museum.

HÀ TIÊN - KIÊN LƯƠNG LANDSCAPE

Hà Tiên - Kiên Lương is a must-visit destination for any tourists in Kiên Giang for its coastal mangrove forest and limestone ecosystem. Hà Tiên is commonly compared to a "natural silk picture" for its mountains, caves, pagodas, islands which are more or less close, namely Mũi Nai, Thạch Động, Tô Châu mountain, Đá Dựng mountain, relics of Bình San Historical and Cultural Relics, Hang Pagoda, Phụ Tử Islet, Dương Beach, Mo So Mountain, Trẹm Islet, Hải Tặc Archipelago and Bà Lụa Island are all attractive to tourists with sight seeing or resort needs.

CULTURE AND HISTORY

Kiên Giang BR contains a rich biodiversity not only in terms of flora and fauna but also takes pride in its cultural heritage with 43 historical and cultural relics designated at national and provincial level. Annually, the province witnesses 389 festivals, of which 91 being traditional festivals, 235 being religious, 62 historical festivals and 1 for both King, Khmer and Chinese Vietnamese people.

Besides promoting ecotourism – cultural tourism activities in order to exploit effectively the local potential, over the last years, Kiên Giang has made numerous attempts to preserve and enhance high value traditional craft village. In particular, when tourists visit a village in Phú Mỹ Commune, Giang Thành District, tourists can see a variety of products such as mattress, bags, and household items made from "bang" grass, a readily available material. Until now, products made from this material have been exported to Japan, Hong Kong, Canada, America, Italy, Swizelands, Chile, Germany and France. Project on Phú Mỹ bang grass preservation in Kiên Giang was supported by International Crane Organization with an aim to protect the grass field effectively and sustainably.

This BR is known for its modest yet effective projects which combine preservation and development needs, help to maintain its local unique cultural identity. Employment for Khmer indigenous people has been created. Groups of researchers, interested businessmen, domestic and international students have come to Phú Mỹ to watch grus antigone crane and visit Khmer traditional craft village, which forms favourable conditions for development programs to promote tourism, and access local investors locally and from other provinces in Mekong river delta■

NGUYỄN THANH HẢI
- TRẦN THỊ HỒNG GẤM

Đồng Nai Biosphere Reserve (DNBR) was expanded and renamed (from Cat Tien) in 2011 due to its rich biodiversity and cultural values. It covers an area of almost one million ha and is situated in the centre of the South-east region of Việt Nam, only 70km from Hồ Chí Minh Ciy (HCMC) and 40km North of Biên Hòa City. The core zone covers over 170,000 ha and consists of three protected areas: Cát Tiên National Park (72,000 ha), Đồng Nai Cultural Nature Reserve (68,000 ha) and the Inland Wetland Protected Area of Trị An - Đồng Nai (32,400 ha).

SIGNIFICANT VALUES

Located in the upper reaches of the Đồng Nai River, DNBR's ecosystem ensures clean water supply in dry seasons and minimizes flooding in the rainy season, particularly to HCMC's residential areas, industrial zone and export processing zone. The biosphere reserve also has rich cultural diversity, being home to 11 ethnic minorities. During the war, these forests hosted "Revolutionary Base D" which made a significant contribution to Việt Nam's victory. Local people still recall remarkable tales about the brave battles and harsh conditions facing the soldiers and the remains of a US military airplane is said to be lying in an inaccessible part of the rainforest.

DNBR has a very high biodiversity value with 1,610 recorded species of plant, 105 mammal species, 351 bird species, 109 reptile species, 41 amphibian species, 1189 insect species and 159 species of fish. Some of these species are extremely rare including mammals such as the Asian elephant, gaur and leopard; and many rare plant species.

A POPULAR TOURIST DESTINATION

Cát Tiên National Park (NP) is the main drawcard for tourists to Đồng Nai due to its natural beauty, rich biodiversity and pristine forests that contain trees such as the huge Tung-tree, which at more than 2 meters in diameter provides a rare example of Việt Nam's once widespread ancient forests. It is also one of the few places where nocturnal wildlife can be easily viewed. These features make Cát Tiên NP valuable, not only for conservation and tourism, but also for scientific research. The Bàu Sấu Wetland has been listed as a Ramsar site due to its international significance for migratory birds.

The Đồng Nai Cultural and Nature Reserve contains many important cultural and historical relics. This reserve provides great potential for combining both natural and cultural tourism due to its close proximity to major urban areas. Trị An Lake at 32,000ha conserves a lake with more than 72 islands, while the 160ha stone park in the town of Định Quán is a good place for a short stop when traveling between Đồng Nai and Cát Tiên. Many stones of exotic shapes among forests trees create beautiful vistas. Tourists coming to the Cultural Nature Reserve also have opportunities to observe wildlife during the day.

Đồng Nai Biosphere Reserve - Wild and Charming

▲ *Gaurs in Cát Tiên NP (Đồng Nai Province)*

DNBR is home to archaeological sites in Cát Tiên that date back to the third until sixth century such as the biggest Lynga - Yoni statues (from ancient Kymer culture) in South-east Asia that are not yet fully understood by researchers.

Eleven colorful ethnic minorities currently reside in DNBR. Visitors can experience their traditional methods of exploiting national resources, and their traditional customs and festivals, including Sayangva, a ritual to pay respects to the God of Rice. Also, the gong culture, based on the gong instrument which is in the UNESCO List of Intangible Cultural Heritage of Humanity is of high importance to several ethnic groups in the DNBR. The unique customs of Chơro people can be experienced more intimately at the traditional longhouse in Lý Lịch (close to Đồng Nai Culture and Nature Reserve). Meanwhile you can stay with the Mạ and Stiêng minorities in a community-owned longhouse in Tà Lài Ethnic Village (close to Cát Tiên NP). In Tà Lai tourists can stay in the newly opened Bamboo House - the first of its kind in Việt Nam and enjoy local specialties such as glutinous rice cake, rice cooked in bamboo stem, grilled meat, forest rattan and traditional wine.

Cát Tiên NP and Đồng Nai Culture and Nature Reserve offers well-furnished hostels and private rooms that are ideal starting points for trekking tours to the forest and ethnic communities. At the centre for ecosystem, culture and history situated near Bà Hào lake and Sen lake where Đồng Nai Festivals and major events are organized. Here tourists have the option to stay indoors or outdoors in comfortable tents.

The wide range of natural and cultural attractions in DNBR will satisfy most tourists and make a significant contribution to conservation and sustainable local livelihoods▪

XUÂN THẮNG

환경부
Ministry of Environment

KEITI
한국환경산업기술원
Korea Environmental Industry & Technology Institute

Center of Global Green Network

KEITI creates a clean and green world by disseminating eco-friendly technologies and establishing global cooperation networks so that every country can enjoy the benefits that the environment offers.

Vietnam - Korea Environmental Cooperation Center - VKECC is an agency established by the Ministry of Environment of Korea that assigned Korea Environmental Industry and Technology Institute (KEITI) the following functions and tasks:

■ Promote and enhance the cooperative activities in the field of environment between Vietnam and Korea;

■Manage funding sources to support cooperation and investment promotion, technology transfer in the field of environmental infrastructure development and new energy (water supply, wastewater treatment, renewable energy, emissions management, …);

■Support Korean and Vietnamese enterprises to promote investment in the field of environmental industry in Vietnam;

■Research and explore the technology market in order to serve the promotion and cooperation development, investment and technology transfer in the field of environment and sustainable development.

For more information about our activities, please refer to:
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